

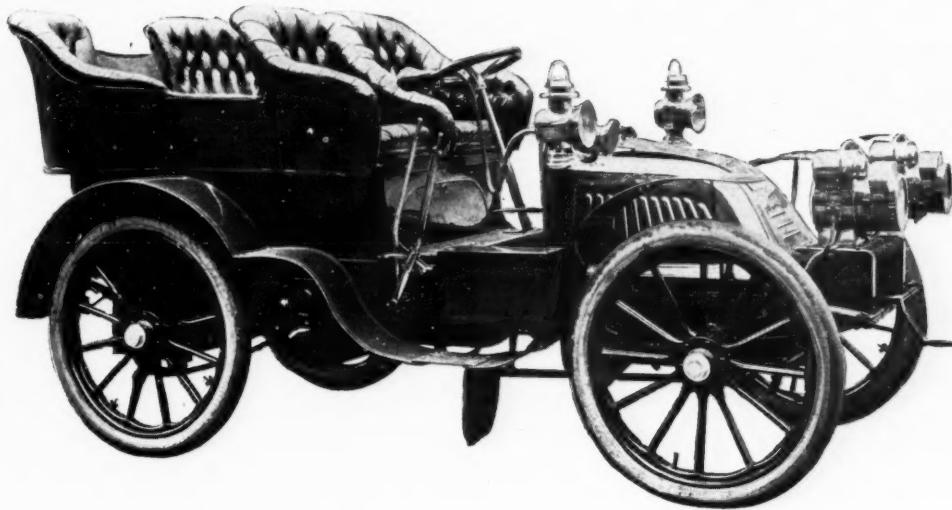
MOTOR AGE

Vol. 3 No. 4

JANUARY 22, 1903

Five Cents

Highest-class Automobiles Panhard, Mors, Renault, C.G.V., Mercedes



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Exhibit**



And Examine

The New Steering Mechanism

which is one of the Features of the Show

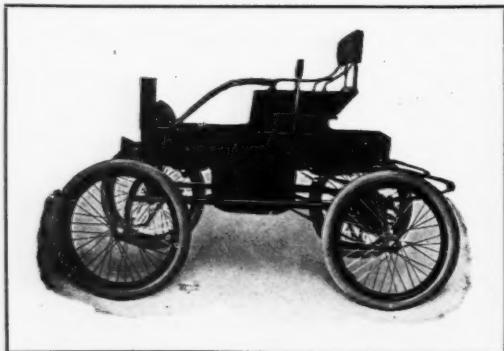
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THE LIGHTEST WEIGHT
THE STRONGEST MADE
THE BEST FINISHED



We will send you a Catalogue or we will write you.
Address

The Baker Motor Vehicle Co., Cleveland, O.

MOTOR AGE

VOL. III. NO. 4.

JANUARY 22, 1903.

\$2.00 Per Year.

RECORD BREAKING DISPLAY

New York, Jan. 17.—Heralded by preliminary advertising to such an extent and of such quality as had never before been accorded a trade exhibition in this city; fraught with rosy anticipation of a splendid triumph within and of the greatest of all juvenile industries of the United States, the third annual automobile exhibition opened at Madison Square Garden tonight. The event is already an unqualified success, reflecting credit of the highest order upon the National Association of Automobile Manufacturers and the Automobile Club of America, under whose joint auspices the show is held, and on Frank Sanger, by whom it is managed. Not only did the public respond liberally to the excellent work of the volunteer press agents, whose love of the sport had spurred them to great effort in the show's behalf, but the exhibitors, entering enthusiastically into the spirit of the occasion, presented a display which has never been equaled in magnitude and rarely in completeness of detail on an opening night. It is interesting to note, as an evidence of the increase of public interest, that the receipts of the first evening were just double those of the corresponding night last year.

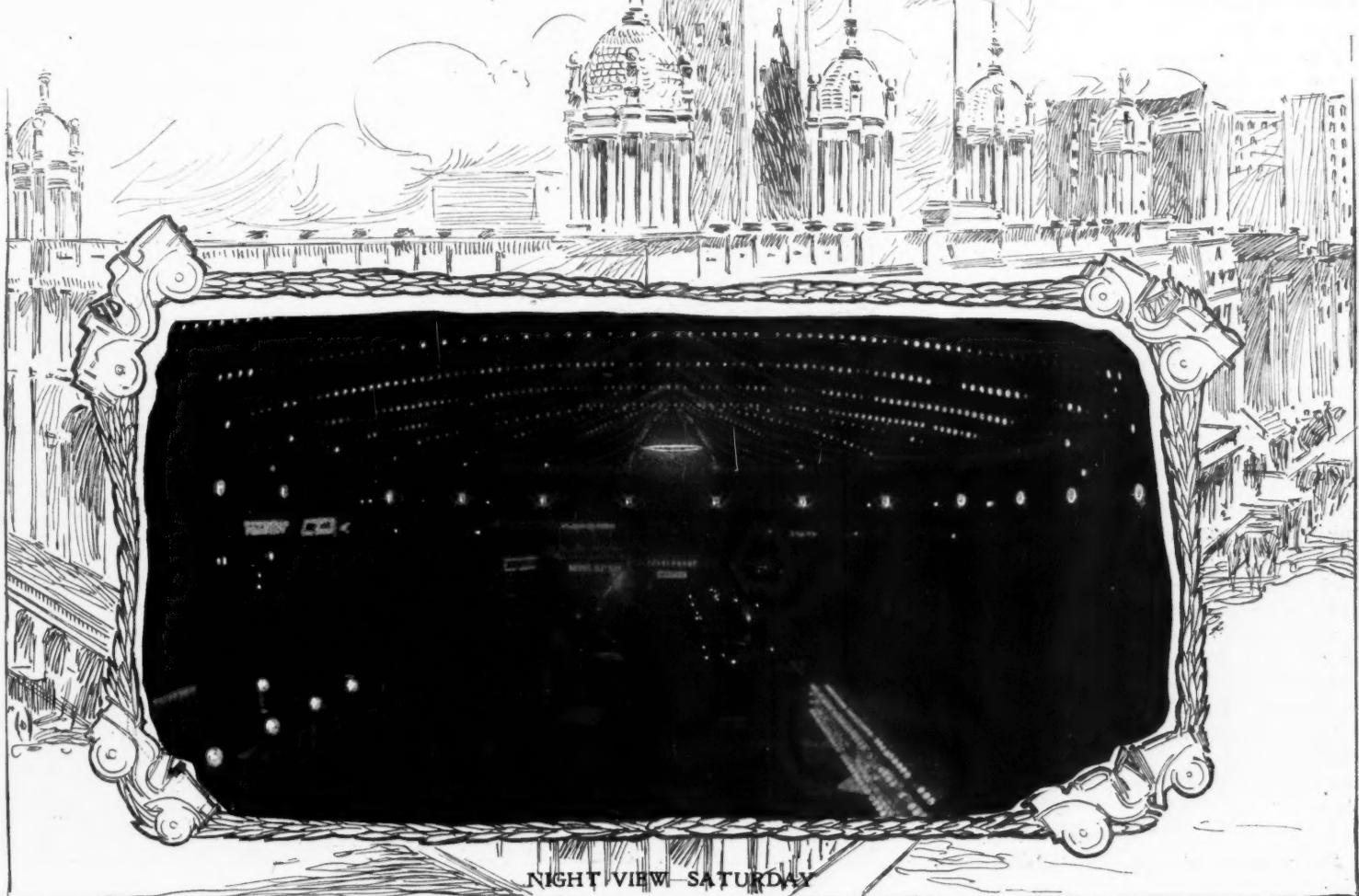
AT MADISON SQUARE

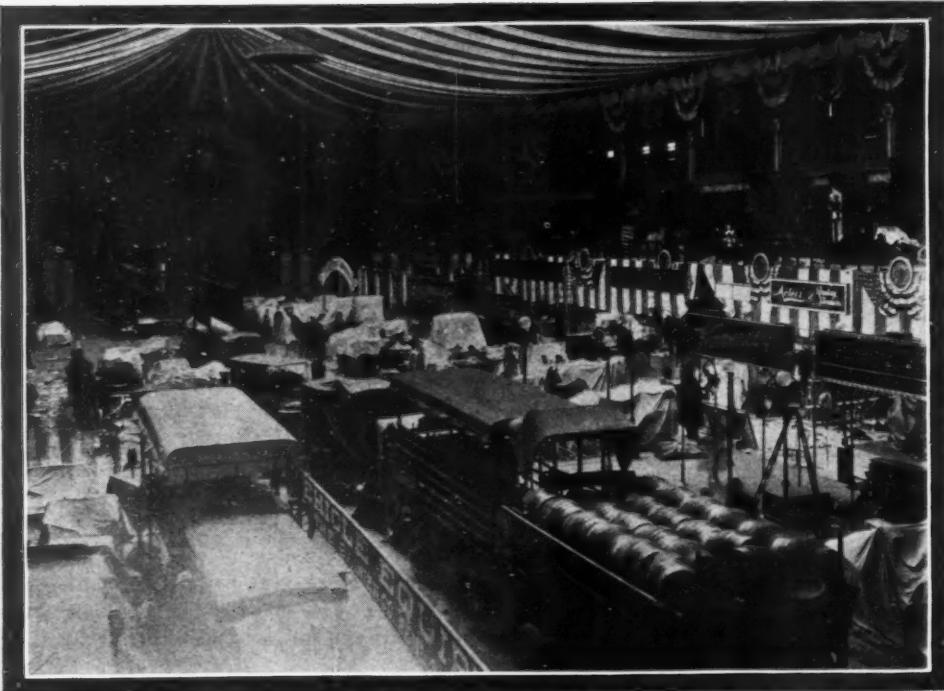
Indications are that the show will mark an epoch in the history of automobiling as a sport and as an industry in this country; that it will in the future be spoken of as the beginning of America's movement into the first rank of motor vehicle using and manufacturing nations, and that it will set the date of the first undeniable manifestation of the general acceptance of the automobile as a good and practical and desirable thing by and for the citizens of the United States.

Within fifteen minutes after the opening of the doors the narrow aisles were crowded with spectators and the railless spaces with eager questioners.

THE GARDEN CLIENTELE

All Madison Square Garden shows can count on a clientele of several thousand regulars, to whom it is enough that there is





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"something doing" in the Garden. This largely loitering, idly gazing contingent has hitherto been a conspicuous feature in the attendance. Tonight it was lost in the throng of really and unfeignedly interested visitors.

THE SHOW SPECTACLE

The permanent decorative embellishments of the Garden in its majestic arches of electric lights that dome the roof need few additions to help them out, though the electric signs, the rich furnishings and the gleaming vehicles added all that was needed to make of the spectacle a thing of beauty. The finishing touches were stripes of lemon and white draped in the ceiling and along the sides of the galleries, and festoons of the national colors on the posts and boxes pinned by the emblem of the Automobile Club of America. It cannot be truthfully said, however, that the scene, as a whole, presented so grand a spectacle as might have been expected. This may have been due in large measure to the crowding of the exhibits on the main floor. The comment was general that the abandonment of railings had a deleterious effect on the appearance of the exhibits.

STATISTICAL INFORMATION

The number of exhibition spaces was 195, of which 130 were on the main floor and balcony, sixteen in the restaurant, thirty-five in the so-called exhibition hall in the basement and fourteen in the first tier boxes. The exhibitors numbered 142, of whom eighty-five were on the main floor and in the gallery, thirty-four in the exhibition hall, sixteen in the restaurant and ten in the first tier boxes. Eighty-one exhibitors show complete cars, nine of them representatives of foreign makers, one a manufacturer of motor bicycles and one a builder of a low-hung quadricycle. Of these sixty-eight show gasoline cars, thirteen steam vehicles and eight electric machines. There are four concerns making both steam and gasoline vehicles, three both gasoline and electric and one building machines of all three classes.

COMPARED WITH PREVIOUS YEARS

For purposes of comparison with previous shows and to give one a specific idea of the

a score of posts arose above the floor. Friday, however, the motor vehicle showmen awoke and the rush began. Swift progress was made and yet this afternoon, with the booths in disorder, empty spots frequent and vehicles cloaked, there seemed to be the uninitiated but the prospect of a woefully incomplete exhibit for the opening. Hustle triumphed and by eight o'clock everything was in good order.

GREAT DEMAND FOR SPACE

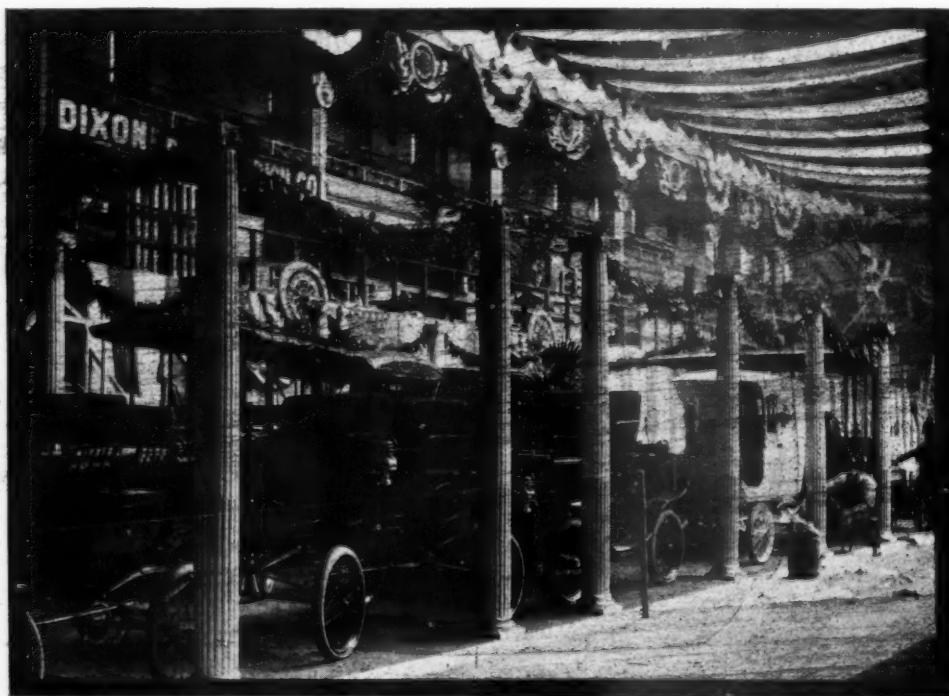
The great demand for space, the compulsory use of the restaurant, boxes and basement for exhibition purposes, is now a matter of history. The narrowing of the aisles and the exclusion of railings and platforms was due to the same general cause and a desire to find room for all applicants for space. Those who were placed in the restaurant have no cause to complain. The ceiling is lofty, the floor superior to that in the main building and the general effect satisfactory. Even in the basement the crowd was great, the display attractive and the temper of everyone jovial.

EXHIBITS ON THE ST. LOUIS

The most marked absenteeism was noticeable at several stands which were awaiting the arrival of European machines on the overdue steamer St. Louis. Among these sufferers were Messrs. Fournier and Rabourdin, of the Paris-Automobile garage, who awaited two Mors and two Renault machines; the Standard Automobile Co., which exhibited some Decavilles; and M. Clement, whose entire exhibit of light automobiles bearing his name was on board. The custom house officials, through the efforts of Secretary Unwin, consented to put the automobiles through with as few formalities as possible, so they will be at their booths at the Garden on Monday. Other importations are also expected on the current steamships.

VISITORS AT THE HOTELS

There is already a great crowd at the hotels. Of course the trade is unanimously represented, the western division being mainly quartered at the Victoria. There are too many extra guests to be confined to the trade, so that the fair inference is that many have



MOTOR AGE

THE MOBILE COLONIAL DISPLAY

come to town to see a comparative exhibit and place orders.

LATE ARRIVALS

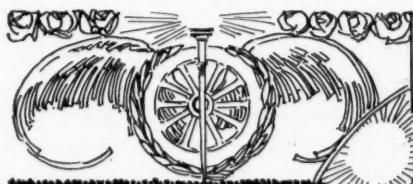
New York, Jan. 20. (Special telegram.)—The Apperson Bros. car arrived today and has been installed. The Mattheson car came in late in the day and the arrival of a Mors for the Fournier exhibit was also hailed with

delight by the speed merchant's multitudinous admirers. The Clement exhibit has arrived on the Philadelphia and will be installed in the morning. The Elmore display was installed today. The Decauville cars have also arrived. The exhibitors are well pleased with the matter of sales so far. The paid admissions for Monday exceeded 3,400, about twice

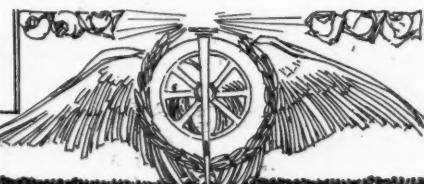
the number of last year. A still greater increase is expected later in the week.

The general appearance of the building is greatly improved by the installation of new electrical signs.

Western men are actively discussing the possibility of electing a Cleveland man president of the N. A. A. M.



SUMMARY OF DISPLAYS



THE VEHICLE EXHIBITS

By all means the most tastily arranged exhibit in the show is that of the famous Toledo and Indianapolis house. It is enclosed within a dozen or more iron posts, each capped with electric lights and carrying a cable supporting a string of smaller lights completely encircling the stand. The center piece is similar to that used at Chicago last year, consisting of three electric signs bearing the words Toledo and Waverley, with the full name of the concern in the center. A sample of each of the company's models is shown, the center of attraction, of course, being the new four-cylinder gasoline car, a masterpiece of the automobile builders' art.

WINTON MOTOR CARRIAGE CO.

This famous house occupies a large space at the end of the south aisle on the west end of the building. No attempt has been made at ornate decoration. The Bullet, two touring cars and a stripped machine constitute the exhibit, which is, of course, one of the features of the show.

DURYEA POWER CO.

The exhibit occupies a diminutive space in the angle bounded by the gallery stairs and outside wall, and consists of the famous three wheeler.

T. B. JEFFREY & CO.

One of the comparatively few concerns which have paid particular attention to the setting of the display. The latter consists of three samples of the well-known Rambler, which were surrounded on Saturday evening by a throng of inquirers.

WALTHAM MFG. CO.

A constant source of interest to the public. The little buckboard vehicle, of which an illustration appears elsewhere, was a general favorite and seemed to indicate that a great many sales could be made of a low-priced vehicle of this class. Other vehicles shown were one of the company's regular models and an Orient motor bicycle. The entire display is in exquisite taste, in keeping with the ideas of the gentlemen who now control the destinies of the company.

WHITE SEWING MACHINE CO.

As usual color effects are in keeping with the name of the company. This extends to the handsome sign and decorations and to more than one of the vehicles. The White company shows a delivery wagon, three touring cars and one of its runabouts of regular pattern.

SMITH AND MABLEY

Partly a loan exhibition and changed daily. The firm keeps on exhibition a sample of each



of its machines and aims to attain color effects in keeping with those of various colleges. Smith & Mabley display their faith in electricity by the use of one of the largest signs in the building. It is about thirty-five feet in length. The foreign cars are, of course, inspected with interest by prospective purchasers of the better class.

LOCOMOBILE CO. OF AMERICA

Four gasoline cars, a delivery wagon and three steamers comprise the display of carriages. A glass case contains a great number of trophies won by the Locomobile. The exhibit is nicely arranged, but modest, as becomes a concern whose president is at the head of the manufacturers' association. The huge signs of last year have been abandoned.

The gasoline vehicles of the Locomobile Co. are attracting considerable attention. The various models are finished in beautiful style, with aluminum molded bodies, one, a limousine, being a particularly handsome vehicle. One feature that has created favorable comment is the carrying of the back of the rear dashes down within a foot of the ground, thus protecting the occupants of the tonneau from dust and flying stones.

WARD, LEONARD ELECTRIC CO.

A single model of the Knickerbocker is housed in a somewhat diminutive space, but seemed to find favor with the people on the opening night.

E. R. THOMAS MOTOR CO.

The Thomas company wisely displays a stripped machine and so affords the public an opportunity to learn all about the operation of its car. A complete carriage and a Thomas Auto-bi are also displayed in an attractively arranged stand.

GEORGE N. PIERCE & CO.

As usual the Pierce display, though small, is tasty and effective. The reputation of the little Motorette has excited interest in the later and larger model produced by the firm for the first time this season. Despite the fact

CROWDED BUT HANDSOME

that its price is higher than that of many other small cars the inquiries indicate that the Pierce carriages will be in great demand on account of their acknowledged excellence.

B. V. COVERT & CO.

The exhibit consists of two small runabouts, of rather distinctive construction.

STEARNS STEAM CARRIAGE CO.

Four samples of small steam carriages comprise this exhibit.

WARWICK CYCLE & MFG. CO.

The characteristic red of the Warwick bicycles of old appeared in the decorations of this stand and the gasoline runabout and motor cycle shown.

HALL MOTOR VEHICLE CO.

A striking gasoline tonneau car finished in black and red took up almost the entire space this company was able to secure. Though built by a new concern in the trade it made itself favorably known and received much commendation.

COUNTY CLUB CO.

The County Club cars were shown in a surrounding of plants and hangings. Oak office fittings gave a hint that the new company was there for business.

MOTOR CYCLE MFG. CO.

Two Marsh motor cycles constitute this exhibit. A frame containing the specifications served to answer many questions.

MATTHESON MOTOR CAR CO.

Up to Sunday evening no machines had reached the show.

AMERICAN GEORGES RICHARD CO.

A clover leaf in electric lights and the French coat of arms and colors constitute the decorations here. Two of the imported cars were on view.

STANDARD AUTOMOBILE CO.

The Decauville cars, for which this company is the American agent, were on the overdue St. Louis and had not arrived at the Garden up to Sunday evening.

BUCKMOBILE CO.

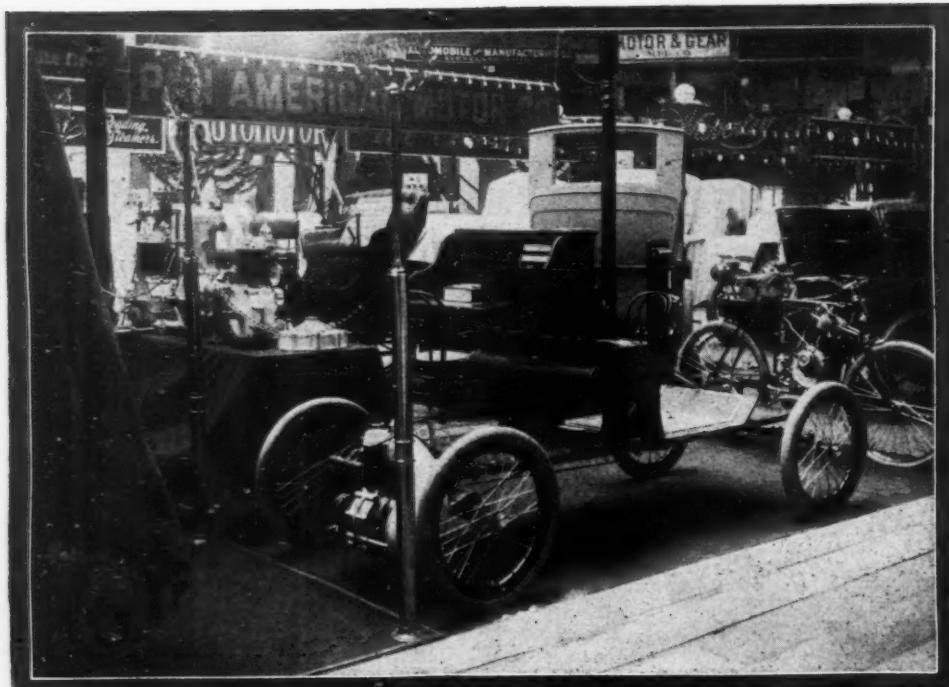
A landscape painting occupied the entire rear of this booth. In the foreground a "buckmobilist" was climbing an abnormally steep grade. A gasoline car of buckboard pattern was exhibited.

WHITNEY AUTOMOBILE CO.

In the midst of office surroundings one of the new gasoline vehicles made by this company was shown.

AMERICAN MOTOR CARRIAGE CO.

American flags were everywhere about this stand and were even used to cover the machines



MOTOR AGE

WALTHAM DISPLAY—SHOWING ORIENT BUCKBOARD

when not on exhibition. Vehicles of the runabout type were on view.

THE B. F. STEARNS CO.

Backed by ornate hangings two samples of the vehicles made by this concern were shown. The big touring car of the French type was most impressive and aroused most favorable comment. This particular car has already been received with great favor among western dealers.

UNION MOTOR TRUCK CO.

One of the company's trucks was shown. The power is transmitted, without chains, sprockets or friction by the company's own device which, it is claimed, allows the engine to run at the same speed under all conditions.

ELMORE MFG. CO.

A stand fitted with oak furniture and hung in green awaited the arrival of the Elmores, which had not come up to Sunday night.

CENTURY MOTOR VEHICLE CO.

Red, the color of the Century cars, was carried out in the hangings of this stand. There were three vehicles on view, representing both the steam and gasoline types made by the company.

H. H. FRANKLIN MFG. CO.

The fact that such light roadsters as these were fitted with 10-horsepower motors seemed by the crowd that sought the stand to have been noised abroad and to have interested those in search of high power combined with light weight.

SHELBY MOTOR CAR CO.

Backed by crimson hangings two of the vehicles made by this company were on exhibition. The changed appearance of the car, over last year's model, was a subject of favorable comment.

CADILLAC AUTOMOBILE CO.

The moderate price of the Cadillac runabout and tonneau gasoline cars, considering what was offered for the money, had been well boomed ahead of the show. The demand for just such cars as these is great and the new Detroit concern's booth was sought

and its exhibit viewed by many without disappointment. Four cars are exhibited.

KENSINGTON AUTOMOBILE CO.

The Kensington cars were in a booth fitted with handsome furniture. The Buffalo company has been at work for the last year perfecting the details of its cars and has made such journeys with them as to have fully demonstrated their stability.

THE WALTER CAR CO.

The Walter cars made a brave showing and the attention they attracted proved that they are likely to become prominent. Besides a stripped chassis allowing demonstration of the machinery three complete vehicles were shown.

O. H. KEEP, JR.

The only Italian car in the show was at this booth. Its popular name Fiat, represents the initials of the company manufacturing it. One of these vehicles made itself favorably known in the reliability run. The machine shown was a massive and impressive vehicle.

KENNETH A. SKINNER

Six De Dion vehicles representing as many types were in the double space Mr. Skinner had secured. Two more De Dion cars were seen elsewhere in the exhibition hall awaiting removal to the booth.

CENTRAL AUTOMOBILE CO.

Potted plants and hanging vines, with electric bulbs scattered among them, made a bower of this stand, where a Mors and a Mercedes, the company's leaders, were on view.

CLEMENT MOTOR AND LIGHT CARRIAGE CO.

The large double space secured had only its fittings and furniture to show, as the exhibit, which was on the overdue St. Louis, had not arrived.

FOSTER AUTOMOBILE MFG. CO.

The Foster company shows a full appreciation of the requirements of the times by the introduction of a touring car steam model, which it shows in conjunction with one of its older patterns, the two forming the complete exhibit.

AUTOMOTOR CO.

Metal bodies, made at the company's own factory, are one of the distinguishing features

of the Automotor Co.'s cars, of which two are displayed. The finish is above the average. One is of the King of Belgium pattern, richly upholstered.

H. BARTOL BRAZIER

The vehicle here shown was of a type primarily for suburban use. It was of French type and was fitted with a top and convenient appurtenances. That there is much demand for vehicles of this especial type was proved by the constant throng engaged in its inspection.

METEOR ENGINEERING CO.

The feature of this exhibit is a steam car, following the lines of the French gasoline vehicles. It is of aluminum color, with royal purple and gold stripes. Two of the company's regular road wagons are also displayed.

GROUT BROTHERS

In fitting their car for longer journeys than have been common the Grout Bros. have attached a condenser in front of which is a brass protector, generally considered a good feature. The car follows French lines. The other car shown has a folding front seat and comfortably carries four passengers.

CONRAD MOTOR CARRIAGE CO.

One of the few concerns which have taken full advantage of the possibilities afforded by a position against a wall, for decorative effect. The back of the space is handsomely festooned in blue. Two of the new Conrad models are exhibited.

CLEVELAND AUTOMOBILE CO.

The Cleveland cars are in the restaurant and occupy abundant space. They are the first shown to the public. Two runabouts and two tonneaus, backed up by a chassis, form the exhibit. The workmanship and design prove that the company made no mistake in taking more time than it originally intended in placing the vehicles on the market.

KIRK MFG. CO.

One sample only of the Yale car is shown, the company having been able to secure only a small and none-too-prominent space in the restaurant.

CENTAUR MOTOR VEHICLE CO.

This house, another of the late comers in the trade, has two electrics on view which, if their performances equal their appearance, will be favorites among lovers of carriages of this class.

HENRY FOURNIER

Fournier, surrounded by friends, lamented the absence of a consignment of Mors cars, which were aboard the disabled St. Louis. They were expected at the Garden Monday.

HOFFMAN AUTOMOBILE & MFG. CO.

A red-festooned background formed a favorable setting for a couple of Hoffman carriages in the restaurant. The company exhibits for the first time at New York.

PRESCOTT AUTOMOBILE MFG. CO.

The Prescott which won a gold medal in the endurance run last autumn was the sole representative of the company's product Saturday evening and was, naturally, an object of interest to education seekers.

BAKER MOTOR VEHICLE CO.

A well selected display of Baker electrics in an equally well selected setting comprised this Cleveland company's contribution to the show. Six vehicles were shown, embracing

the principal features of the company's line. Faith in the efficacy of electricity was further demonstrated by a suitable electric sign bearing the single word Baker.

STUDEBAKER BROS. MFG. CO.

This world-famed house makes its first appearance as an exhibitor at an automobile show. It occupies a prominent location at the east end of the building. Its display is, of course, fully up to the standard of Studebaker excellence and comprises four electric vehicles of as many patterns.

VEHICLE EQUIPMENT CO.

A sadly crowded condition of affairs mars the effect of what is really one of the most interesting displays. It consists almost exclusively of delivery wagons and drays, four of them being of immense size, and two of which are loaded with barrels to illustrate their capacity. If all stands were as thoroughly filled it would be necessary to limit the attendance of spectators.

ELECTRIC VEHICLE CO.

Great was the outcry when it was learned that many of the important makers had been forced to accept space in the restaurant. The Electric Vehicle Co. was one of them. And yet the people so situated certainly do not suffer, from the standpoint of appearance of the exhibits, at least, with those on the main floor. The room appears brighter, better decorated and in better taste than the Garden proper, the side walls affording opportunities for decorative effects and the mosaic floor presenting a really finished and pleasing appearance. The Electric Vehicle Co. has the largest display in this department, consisting of eight carriages, of which the center of attraction, of course, is the new gasoline touring car, a magnificent production, which seems to show that the superiority of the foreign car is now more imaginary than real.

HAYNES-APPERSON CO.

This is another of the great western makers whose exhibit was relegated to the restaurant, but which, nevertheless, suffers nothing in comparison with some of the more fortunate early-comers who secured accommodation in the main hall. Four models are shown.



MOTOR AGE

A SUNDAY VIEW FROM THE GALLERY

Haynes-Apperson vehicles are favorites in New York and are holding their own, as shown by the demands upon the time and attention of the attendants.

BERG AUTOMOBILE CO.

Four cars are shown by this New York-Cleveland house, the result of years of study by Mr. Berg at home and abroad. Each carries four passengers and one is fitted with a limousine body.

MOBILE COMPANY OF AMERICA

White columns, rising 10 feet or more above the floor, surround the display of this veteran company. Seven models are exhibited, of which a delivery wagon is one of the principal features.

PEERLESS MOTOR CAR CO.

Like most of the Cleveland houses the Peerless company has surrounded its exhibit proper with furnishings in keeping with the excellence of its product. A small, central office is surrounded by a massive brass railing

and the entire space is carpeted in blue. The exhibit consists of three complete cars, of course including the new four-cylinder production and a Peerless chassis.

PACKARD MOTOR CAR CO.

That few of the heavy cars compare in general excellence of workmanship with the Packard was the opinion, generally expressed, on the opening night. Here, indeed, is one of the machines which will quickly dispose of the alleged supremacy of foreign-built cars. The new, four-cylinder car has constantly been the center of a wondering group. The older model is also shown, being of practically the same form as last year.

FOURNIER-SEARCHMONT AUTOMOBILE CO.

Located at the extreme end of the building, but directly facing the center aisle, the Searchmont company has a favorable, though small space, of which it makes the best possible use. A white pillar stands at each end, and on top of each a powerful acetylene lamp throws its rays down the aisle. Only two cars are shown—two of the company's latest models.

PAN-AMERICAN MOTOR CO.

Four cars, but not of the type to be built hereafter, are shown. They are a part of a production of eighteen, for which orders were taken at the last show. The company's new cars will be built at the factory formerly owned by the Automobile Co. of America.

U. S. LONG DISTANCE AUTOMOBILE CO.

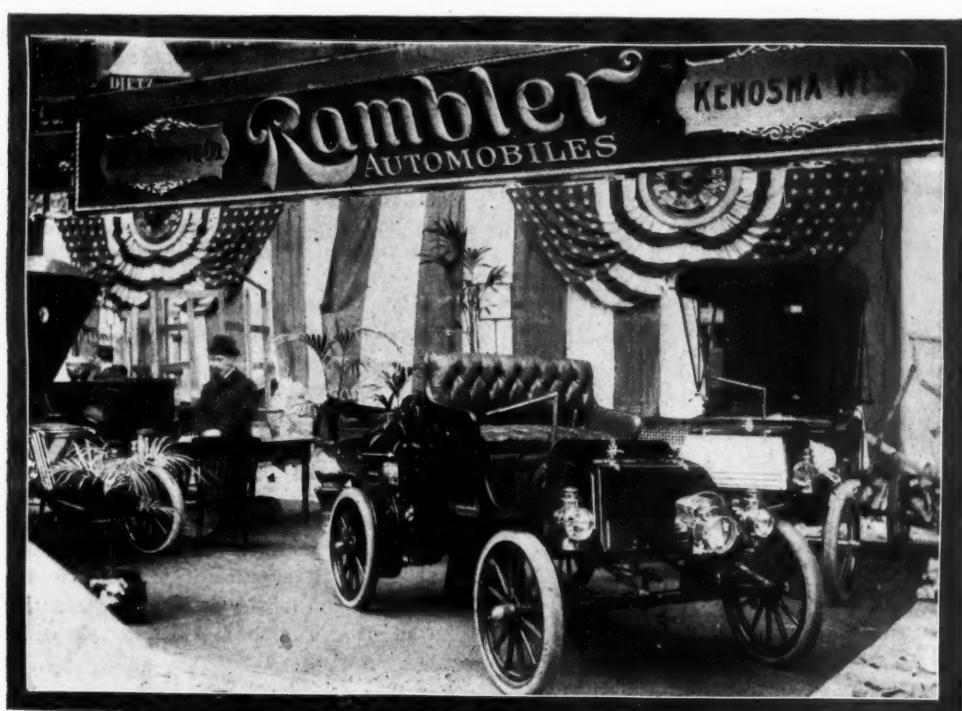
This company displays seven cars in a well ordered space in the center of the building.

KNOX AUTOMOBILE CO.

The waterless Knox—a clever conception in the line of a title—naturally commands attention—first, because it has been tried and found true, and second, because of the inestimable value, in the opinion of many men, of the waterless feature. The display is not a large one, but all sufficient, consisting of three models and has been inspected by many people who gave evidence of a desire to do business.

NATIONAL MOTOR VEHICLE CO.

This house was threatened with relegation to the restaurant, but persistence triumphed,



MOTOR AGE

THE RAMBLER EXHIBIT

and a very small space was secured on the main floor. The company also occupies space in the restaurant, and in the two displays its line of five vehicles described in last week's issue of *MOTOR AGE*.

J. STEVENS ARMS & TOOL CO.

The company is poorly located, but makes the best of the matter with a display of two Stevens-Duryea cars.

AUTOCAR CO.

An intelligent understanding of the public's needs, and a wrinkle which other makers might copy to advantage, is found in the Autocar Co.'s stand. It consists of a chassis, beneath which is a large mirror, so that the investigator may examine top and bottom without difficulty. The company also shows two complete cars.

OLDS MOTOR WORKS.

It has been the policy of the Olds people to so make their vehicles that they may be brought up to date by the introduction of new features at nominal cost. It was known long ago, for example, that there would be nothing new about the 1903 vehicle which could not be easily applied to that of 1902. How fully this policy has been followed is demonstrated by a display of a 1901 vehicle, brought fully up to date by means of an expenditure of \$40. The Olds company shows half a dozen cars, including a delivery wagon.

DESERON MOTOR CAR CO.

The exhibit was, unfortunately, hidden away in one of the boxes. The Deseron spark plug is also exhibited and its merit demonstrated at the same stand.

CREST MFG. CO.

Three of its handy little cars were shown by the company. One of them, quite new, has its motor under the bonnet and is of general French lines. For its price it is one of the best looking in the show.

GENERAL AUTOMOBILE & MFG. CO.

Although forced to accept a gallery space this enterprising Cleveland house spared no trouble or expense in decorating its booth attractively. Three of its cars are displayed to advantage and it is understood that, even had

the show closed Monday, the business result would have been satisfactory.

APPERSON BROTHERS

The firm's exhibit had not arrived, thanks, it is said, to neglect on the part of one of the railroad companies.

HOMAN & SCHULTZ.

This firm holds the New York agency for the Northern, another of the Detroit products, of which two samples are exhibited.

MOYEA AUTOMOBILE CO.

This company, which is preparing to manufacture on a large scale, shows a Rochet-Schneider, which is to form the basis of the new car.

POPE-ROBINSON CO.

Expensive touring cars form the line of this house. A sample vehicle of refined workmanship and appearance is shown on the main floor.

AJAX MOTOR VEHICLE CO.

This company, which manufactures its product in New York city, shows two of its neat electric runabouts on the north balcony. The cars are finely finished and have all the latest improvements, with several new features original with the company.

MECHALEY BROTHERS

A touring car fitted with a 12-horsepower Brennan motor and weighing 1,450 pounds is shown by this firm in connection with the exhibit of the Brennan Motor Co.

THE PARTS AND SUNDRIES

Many Novelties and Gorgeous Displays of Standard Appurtenances

HARTFORD RUBBER WORKS

In its usual tasteful style the Hartford comfort single tube, Dunlop detachable, Hartford solid tires and Turner endless, the two last named for all classes of vehicles. It also shows a line of rubber mats for vehicles.

BADGER BRASS MFG. CO.

A 2,000 candle power acetylene gas lamp, styled "Old Sol," and listing at \$100 is the fea-

ture of this booth where the company shows the now famous line of Solar gas and oil lamps. The larger sizes of gas lamps are reproductions of the best looking French lamps.

FISK RUBBER CO.

This house shows for the first time the Fisk detachable tire. The demand for a tire allowing of maximum activity through the placing of the air chamber entirely above the rim is responsible for the production of this tire and the makers claim unusual demands for it. They also show their standard line of single tube tires in all sizes as well as a simple and effective repair outfit for use by the amateur or professional.

FIRESTONE TIRE & RUBBER CO.

The company shows a heavy solid tire worn down to the rim, a length of wear which, it claims, is possible only with this style of tire.

GRAY AND DAVIS

A pretty line of acetylene gas headlights and oil lamps is exhibited, all of the gas lamps being of French style.

METALLIC RUBBER TIRE CO.

A full line of tires with small metallic disks set in the tread is shown. Great wear and length of life is claimed for this tire.

THE AMERICAN ROLLER BEARING CO.

Claim is made that the success attained by their bearings last season was such that no change is necessary. The bearings are to be seen in practically the same shape as last year.

BALDWIN CHAIN AND MANUFACTURING CO.

The Baldwin company, which made 20 miles of chain last season, shows its line of detachable and riveted chains and a line of sprockets.

CHAMPION MFG. CO.

Three styles of the Champion transmission gear are shown. No. 1 for 3 to 5 horsepower; No. 2 for 5 to 10 horsepower and No. 3 for 10 to 15 horsepower. The company also shows special gears for direct drive.

WESTON-MOTT COMPANY

Front and rear axles, hubs, rims, wire wheels, wood artillery wheels and steering knuckles are shown attractively.

DIAMOND RUBBER CO.

A green background with plants, tastefully arranged, is the feature of this company's exhibit. Diamond tires, inner tubes and sections of tires presenting the Diamond method of attachment are shown. The company occupies two spaces.

INTERNATIONAL AUTO AND VEHICLE TIRE CO.

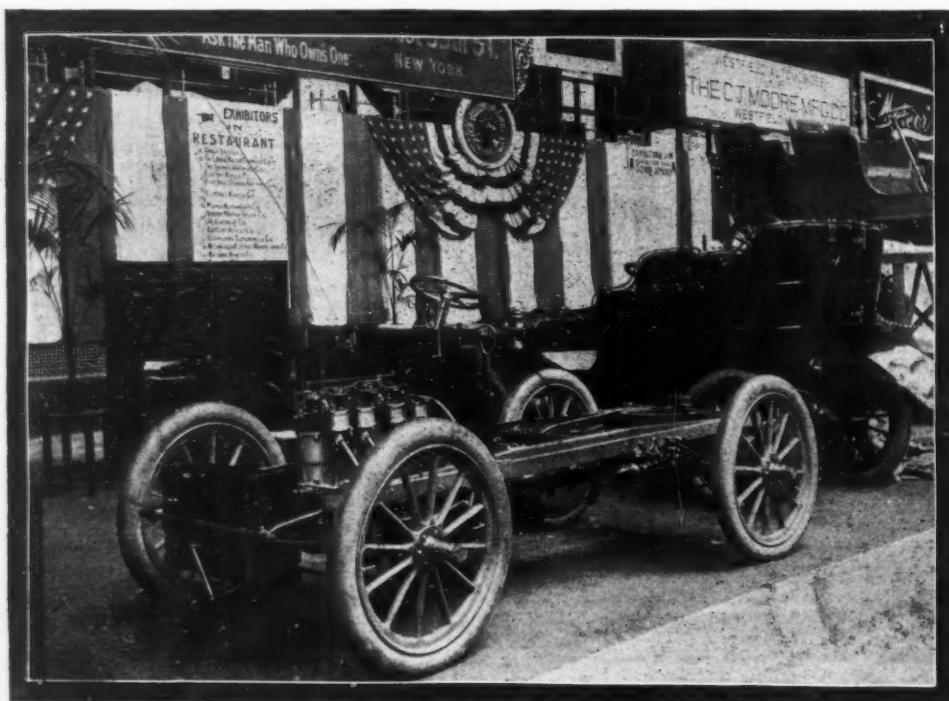
This company has one of the most striking stands on the gallery. It represents a Turkish cosy corner, hung with Oriental drapery and trimmings of armor. An attractive electric decoration draws attention to the exhibit in the evenings. Samples of International tires are shown.

THOMAS J. WETZEL

Mr. Wetzel represents the Midgley Mfg. Co. of Columbus, O., the Brown-Lipe Gear Co. of Syracuse and the Timkin Roller Bearing Co. The most striking exhibit is that of the Midgley company, sections of Midgley wheels, cut away to show the improved method of brazing are shown, as is the wheel in various stages of manufacture. The Brown-Lipe compensating gear and the Timkin bearing are shown in various sizes.

ATWOOD MFG. CO.

A black background, arranged in tiers on which are Atwood lamps in various attractive



PACKARD DISPLAY—SHOWING NEW FOUR CYLINDER CHASSIS

finishes, calls attention to the company's exhibit. The lamps are all oil burners and are shown in several sizes.

NATIONAL CARBON CO.

For the purpose of demonstrating the ignition properties of its Colombia dry battery a small gas engine is shown in operation by this company. An attractive display of batteries is also made.

A. H. FUNKE.

Beside the line of horns, Kelecom motors, lamps and fittings, which Mr. Funke imports and is exhibiting, he is also showing a new spark plug, the Baldwin, introduced for the first time at the show. This plug has a large sparking surface making it almost impossible to clog. It has no platinum points to break and gives promise of proving an important factor.

DOW PORTABLE ELECTRIC CO.

A most complete exhibit of coils, batteries and spark plugs is made. Coils in various forms for motor cycles, small and heavy automobiles are presented in attractive cases. The company's exhibit is not confined to its own stand as many of the vehicles on the main floor show Dow coils and fittings.

WHITNEY MFG. CO.

The main feature is a show case in which are two shafts, that are connected by various sized sprocket wheels showing the many styles and sizes of chains made by the company. They include almost every size used, from the small bicycle chain, up to the big roller variety used on the high powered vehicles. Among them is the Wizard, which contrary to the general type, has teeth which fit over pins on the drive wheels.

THE CUMMINGS TIRE MFG. CO.

A pneumatic tire protector consisting of an outer wearing band of leather wire quilted, attached to a peripheral crown of heavy sole leather, is exhibited. The company claims that the protector does not affect resiliency, makes the tire puncture proof and increases traction and life.

AUTO SUPPLY CO.

This company shows almost every part needed for the construction of a gasoline motor car. A completed car, in the white, built from the company's motor and fittings add to the commercial value of the display.

R. E. DIETZ CO.

A white silk pleated background trimmed with gold shows off to advantage the lamps made by this company for the automobile trade. The lamps are finished in several styles and at night form an interesting exhibit for those who are not familiar with the line.

E. J. WILLIS

A full line of automobile sundries and accessories shown by Mr. Willis includes the Bougie. Herz and Hussey's line of steering wheels and parts. A Merkel motor cycle with a spring frame is also shown.

JOS. DIXON CRUCIBLE CO.

While showing its full line of graphite the Dixon company is taking special pains with Dixon's motor chain compound.

B. F. GOODRICH CO.

As might have been expected the Goodrich company has adopted its usual rich and elegant style in fitting up its spaces. Heavy velvet curtains form a background and in the center hangs a painting of one of its poster girls. A profusion of cushions are scattered on comfortable settees and amid the luxurious sur-



MOTOR AGE

ANOTHER GENERAL VIEW SUNDAY

roundings are displayed the full line of Goodrich clinchers and solid tires, which are shown in all sizes and shapes for every style of vehicle.

VEEDER MFG. CO.

In addition to Odometers and cyclometers the Veeder company shows for the first time the tachometer in operation. This device may be attached to any vehicle and will give an accurate register of the rate of speed under all conditions. The booth is handsomely arranged in fittings of ebonized oak and is the same as was used by this company at the Pan-American at Buffalo.

POST & LESTER CO.

The company shows a full line of accessories and sundries and nothing seems to be lacking to fit the automobile owner or manufacturer with everything he might require—imported French horns, lamps and parts for both gasoline and steam cars are ready for the criticism of the careful buyer.

ROSE MFG. CO.

This concern shows its line of Neverout lamps.

CONSOLIDATED RUBBER TIRE CO.

The line of solid tires shown by the Consolidated company comprises all sizes for all kinds of vehicles, both horse drawn and power driven.

G & J TIRE CO.

H. A. Githens, smiling and urbane as usual, explains that the G & J Tire Co. is getting more demands than ever for its popular tires and a short talk on quality and a demonstration as to ease of repair sends the curious away from this booth in a happy frame of mind. G & J quality is the burden of their song.

CONGER MFG. CO.

Stoltz gasoline motors from 3 to 24 horsepower, with one, two, three and four cylinders, all finished in aluminum, constitute this company's exhibit. The feature of the motors are the mechanically operated inlet valves and double contact points for the sparking device.

HYATT ROLLER BEARING CO.

A sign made of rollers taken from their bearings direct the interested party to the dis-

play of the Hyatt company, where is shown a full assortment of roller bearings which it is in a position to fit to any style vehicle. Mr. Svenstrom claims to have equipped some 8,000 vehicles with this bearing and that all are in use at present.

TWENTIETH CENTURY MFG. CO.

There are lamps and lamps, says F. E. Castle. "Tell them simply that the 20th Century company is paying as much attention to perfection in workmanship as usual and our lamps do the rest." The company shows a full line of acetylene head lights and oil lamps of most approved patterns.

ELECTRIC STORAGE BATTERY CO.

Appropriately located next to the exhibit of the Electric Vehicle Co., which uses this company's Exide batteries, this display is made interesting by an easel showing the plates and parts forming the battery.

GOODSON ELECTRIC IGNITION CO.

An igniter of the magneto type having a spring impelling device connected to a crank on the armature whereby the armature is made to rotate for a portion of a revolution at a speed which is entirely independent of the speed of the engine, constitutes this company's exhibit. The magneto is intended to do away with the use of batteries for the initial spark.

WESTINGHOUSE ELECTRIC & MFG. CO.

All the electric appliances needed for the manufacture and charging of electric automobiles are shown by this company. At the rear of the exhibit are two switchboards with rheostats for gearages and private stables.

BRENNAN MOTOR CO.

Brennan motors in various sizes including horizontal and double cylinders, form part of this company's exhibit. The new Brennan carburetor, with its great flexibility and variation of throttle, is fitted to the company's latest models.

EDWIN L. SMITH

A steering check for steam and gasoline automobiles is made and shown by this exhibitor. The appliance prevents the steering wheels from moving in any but the desired direction



MOTOR AGE

and obviates the danger of the steering lever being knocked out of the hands of the operator.

AMERICAN COIL CO.

The spark plugs made by the company are shown in a booth formed of artistically draped American flags with a profusion of electric lights. The patriotic display forms one of the features of exhibition hall.

BARBER MFG. CO.

A booth formed of blue bunting tastefully decorated with plants makes it pleasant surroundings in which this company shows its new kerosene burners for steam carriages and trucks.

ELECTRO MAGNETIC SPEED GEAR CO.

This company's exhibit was not in place up to Sunday evening.

STANDARD ANTI-FRICTION EQUIPMENT CO.

The well known Beasley tire which it is claimed is nearly as resilient as a pneumatic and cannot be disabled by punctures, is shown, together with the Empire ball bearing axles made by the company.

MERIAM ABBOTT CO.

A gas engine, run with illuminating gas, with an electric generator forming an integral part of the machine present this company's charging plant intended for owners and operators of electric automobiles.

SHELBY STEEL TUBE CO.

Short columns formed of nests of tubing, circled with coils of smaller tubing are strung along this company's exhibit. Samples of the various shapes and sizes of the seamless tubing made constitute the exhibit.

GLEASON-PETERS AIR PUMP CO.

Air pumps of all sizes from the small hand pump to the heavy power pump, tanks and other fittings necessary for the generating and storage of air for tires makes this exhibit one of the most complete in its line.

COLE & WOOP

The miniature electric runabout built for Master George J. Gould, by this firm and exhibited in its space, attracts considerable attention from the juvenile visitors. The ma-

THE SOUTH GALLERY

chine weighs 300 pounds and will run 3 hours on one charge.

EDISON STORAGE BATTERY CO.

The much advertised Edison battery about which so much has been written and of which so little is known, is shown in one of the small boxes, topped with a modest sign.

LINDSAY-RUSSELL CO.

Motors, compensating gears and everything entering into the construction of a gasoline or electric automobile except the body and the tires make the company's exhibit interesting to those familiar with the technical points of the automobile. The products are commanding attention owing to the quality of the material and the care shown in the finish.

HENDEE MFG. CO.

The well known Hendee motor cycle which has been described in MOTOR AGE catches the eye of those interested in the modern bicycle. The vehicle is shown in the exhibit of C. F. Splitdorf.

GOODYEAR TIRE & RUBBER CO.

Heavy artillery wheels attached to stands for demonstrating the operation of replacing tubes in the Goodyear tire form a feature of the center box at the west end of the building where this company's exhibit is located.

AMERICAN BALL BEARING CO.

The rimless wheel with wheels turning at the end of each of its spokes and fitted with this company's bearings and kept constantly turning is one of the eye catchers of the south gallery.

RUSHMORE DYNAMO WORKS

This company has been building locomotive lights for years and has introduced an acety-

lene with a lens mirror for high power automobiles. The lamp is made with a controlling lever so that the operator of the car can throw his light far ahead and follow all curves in the road.

BUFFALO GASOLINE MOTOR CO.

Two, 4, 8 and 14-horsepower motors, those fitted with reversing gear and built for automobiles and launches, occupy three spaces. The motors are attractively finished in aluminum.

NEW PROCESS RAW HIDE CO.

Almost every type of pinion used in the automobile and made noiseless by rawhide teeth are shown in a glass case. At the back of the exhibit the company's name is shown on the raw hide which goes into the construction of the New Process products.

C. F. SPLITDORF.

An immense coil box over 4 feet long and 3 feet high attracts attention to the varied type of coils made by Mr. Splitdorf. Coils adapted to various purposes from a motor cycle to a big racing car are shown with boxes to suit all conditions.

MOTOR & GEAR CO.

A chassis, fitted with a two-cylinder motor and another with a four-cylinder motor, all the parts of which are this company's product, attract considerable attention. The parts are modeled after French and German ideas with improvements suggested by the demands of the American trade.

WHITLOCK COIL PIPE CO.

This concern is a newcomer in the automobile trade. It is exhibiting samples of its work in pipe bending, showing a big variety of turns and shapes in large and small tubing. A new radiator just introduced will be shown later in the week.

C. J. MOORE MFG. CO.

Three complete bodies fitted with running gear and all fittings constitute the exhibit of this company. One of the bodies is finished in attractive colors and of the other two, one intended for a single cylinder motor and the other for a higher powered and larger engine.

ELECTRIC CONTRACT CO.

An interesting line of electrical novelties including the well known "Light of Asia" lamps, flash lamps and gauge glasses, lamps built for use on steam and gasoline machines, is exhibited by the company. Several of the machines shown on the floor of the building are fitted with the firm's products.

CHARLES E. MILLER

The spaces occupied by Mr. Miller include Salamandrine boilers, with one built for the British army transport; Wilson & Hayes' fenders and hoods; the Fox valveless steam engine; Kingston carburetors; boilers built by the Steam Carriage Boiler Co.; Billings & Spencer drop forgings; Dayton automatic igniting dynamos, and the Apple Magneto igniter.



WINTON AND FOURNIER ARE LIKELY TO RACE



Alexander Winton

Cleveland, O., Jan. 16.—It is a ten to one shot that, as in 1902, the biggest automobile meet of the season of 1903 will be held in Cleveland. And it is a safe guess that the star performances will be a series of races between Alexander Winton and Henry Fournier, the famous Frenchman. It is probable that the conditions of the meeting will be arranged at the New York show this week, and it is almost certain that one of the conditions will be that the big event shall be held at the Glenville track, Cleveland. Winton, as the challenged party, has the right to name the date and place of meeting, and as he is partial to the Cleveland track he has already intimated that he should prefer the race to be held there.

There are other reasons for favoring Cleveland. The track is one of the widest in the country and is banked for high speed. It has recently been resurfaced, so that it is now even faster than last year, when Winton pronounced it the fastest track in the country. Then, too, there is not a more enthusiastic city in the country over the new sport, as was fully demonstrated last year when over 10,000 people cheerfully paid from \$1 to \$2 each to see automobile races.

Winton will not race for money; neither will he race for a side bet or a division of the receipts. The Clevelander says he is an amateur and will never race for money. The Cleveland club which engineered the meet last year would undoubtedly be willing to put up a very fine cup and would perhaps be willing to pay Fournier's expenses, but he could not make any money here; on this point Winton is determined.

If the race is held at all it would have to come after the big international events to be held in Europe early in the summer. Winton is entered for a number of races and could not get back before about July 25. The machine which Winton is now constructing will be used in the race with Fournier. It is somewhat lighter than the famous Bullet and is said to be on about the same lines.

WINTON'S STAND

New York, Jan. 17—Alexander Winton gave out tonight at the show the conditions under which he will race Henri Fournier. They are:

Contest to be not earlier than July 25, 1903, the exact date to be mutually agreed upon later.

Track to be hard and otherwise in good condition for automobile speed.

Distance to be 25 miles, and I would suggest starting one at the wire and the other at the half-mile post.

I am informed that he has contested against a professional at Detroit, Mich.

It is hardly necessary for me to call attention to the fact that in meeting Mr. Winton I am crossing the ocean, traveling several thousand miles, and subjected to a large expense, aside from neglecting my business, which demands more time than I can now give it.

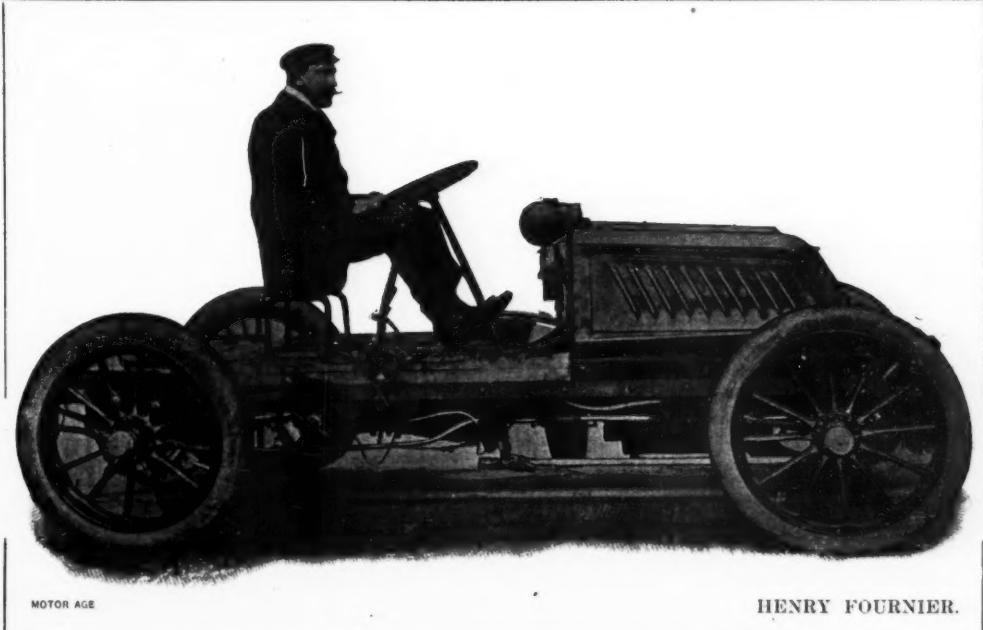
I am willing with my representative to meet Mr. Winton and his representative at any time or place he may designate and complete the arrangements outlined above, which I believe all will admit are more than fair on my part.

MORE ENTHUSIASM WANTED

Cleveland, O., Jan. 17.—A meeting of the Cleveland Automobile Club has been called for January 27 to be held in the library of the Chamber of Commerce. One of the points to be acted upon at that time will be a motion to change the constitution and by-laws so that the annual meeting and election of officers will be held in January instead of May. The change is desired, so it is announced, in order that incoming officers may lay plans for the season sufficiently early to admit of success. At present officers are elected too late to do good work. It is rumored that back of this proposed change is a dissatisfaction in certain quarters at the action, or rather lack of action, on the part of some of the present officers and committees.

During the past season there has been a woeful lack of meetings and runs because of the inability to get together the committees having these matters in hand. For the coming season some of the more progressive members hope for a change. They want more club runs and other social features, and particularly do they desire that some plans be laid toward securing a club house, or at least club rooms.

The Packard motor car has no reason to be ashamed of its catalogue or its maker. The Packard Motor Car Co., of Warren, Ohio, has produced a piece of trade literature which is a criterion. It deals fully with the processes of manufacture both by words and pictures and explains the principles of construction of the carriage thoroughly and in language wrought for the laity and not for technical erudites. The book is certainly worth while and worth having.



MOTOR AGE

HENRY FOURNIER.



CRITICAL REVIEW OF THE SHOW

Gasoline Cars Predominate—Tendency in Construction Is Toward European Style Patterns—Horizontal Motors Gaining—Mechanical Lubrication on All Cars—Many Systems of Transmission—Wood Wheels and Detachable Tires in Favor—Highly Furnished Vehicles Common



This is essentially a gasoline show. There is no doubt of it, substantially three-quarters of the constructionally different styles of vehicles displayed being gasoline machines. There are many new makes among the gasoline numbers, while all of the steamers are built by firms established for some time in this class of automobile construction. Also some of the steamers seen at previous shows are not present. Those shown, however, and all of the electrics also, are cars of well-known reputation and with an accredited wide usage.

Aside from the preponderance of the gasoline cars, the most quickly noticeable consideration at the show is that the construction has continued steadily "Frenchy" since last year. Out of sixty-five different makes and distinct patterns of the same make on exhibition opening night, thirty-five are of motor-front construction, while twenty of the motor-back cars have box fronts which are more or less closely copied after the motor bonnet which has typified motor-front construction; leaving only one-ninth of all of the different styles of gasoline cars with the peculiarly American style of motor-back design.

There are no shaftless carriages except among the electrics. Even the steamers show the influence of European style of motor-front design, both in body shape and in some instances in boiler and engine disposition. MOTOR AGE does not express an opinion or attempt to favor any system of construction in making these statements. It simply relates the facts presented graphically at Madison Square Garden.

STEAMERS WELL MADE

Reverting to the steam machines, it is peculiarly noticeable that there is a greater uniformity of construction than in either the gasoline or the electric field. Changes have been made in the way of constructing tonneau cars, etc., but there is no radical development of the steam power plant, which appears, generally speaking, simply as a more efficiently constructed apparatus with more carefully evolved detail than formerly. A few of the cars have condensers. The White still remains the representative of flash boiler construction. Most of the cars have mechanical lubrication and the full quota of automatic devices to regulate the fuel, air pressure and water. On the whole the construction is heavier and the range of opera-

tion greater. The machines are all well made and their small representation is hardly consistent with the great showing made by the steamers in the reliability run from New York to Boston and return.

ARTISTIC ELECTRICS

The electric carriage display presents a greater range of carriage designs for the number of distinct constructional systems than either the gasoline or steam displays. Nearly all of the makers have numerous models. In these the chief points in the development since last year are the more common disposition of the motor under the body, with chain drive, and the more extended use of the low voltage motor. Divided batteries to distribute the weight more evenly upon the four wheels are seen in more instances than at preceding shows. In the matter of design and finish the electrics are superb, the highest stage of the carriage maker's art having been reached. Especially is this true of the enclosed vehicles, in which all the conveniences known to the trade are seen, even to facilities for combing Milady's hair while en route to the theater.

GASOLINE CAR CHANGES

An inspection of the gasoline cars shows that vertical, multiple cylinder motors predominate. It is surprising to find, also, that batteries, both dry and storage, far out-number magnetos and dynamos for supplying the ignition current. Mechanical lubrication has crept during the past year from an inconsequential minority to the great majority. Sliding gear transmission has but a small lead over planetary gear transmission, while the remainder of the cars are well divided between gears with sliding clutches and with friction clutches. It is noticeable that the planetary gears are used on several of the middle or large size cars, and, also, that many of these gear sets are constructed entirely of steel and bronze gears. Most of them are enclosed.

There is an increased number of mechanically operated inlet valves, but four-fifths of the motors still have the automatic or suction



operated inlet valves. Single chain drive predominates, even including the heavy cars, while there are more bevel gear drives than double chain drives. It is thus found that over three-quarters of the cars have live rear axles. Another feature of construction which has grown steadily in popularity during the past two or three years and leads to a majority at this year's show is the spur gear differential.

NEW PREFERENCES

Among features which are found on cars of all three types, the fact that detachable double tube tires lead in number is first. After this comes the growth in precedence to first place of wood wheels, and then of channel or angle iron or steel running gear frames. The tubular frame is found in but few instances on the gasoline cars, and those frames which are not of angle or channel iron or steel are generally of wood, or wood lined with steel flitch plates. The dropping of the reaches from the frame and the substitution therefor of tie or distance rods, in connection with three-quarter or semi-elliptical springs, is concomitant with the increased use of the steel and wood frames. Speaking generally of all the vehicles shown, it is evident that both spring length and weight has been increased, the former to provide greater comfort and the latter to insure equal or increased strength.

THE TABULAR SUPPLEMENT

The tabular summaries on the supplement to this issue of MOTOR AGE of the different styles of construction presented by the show furnish a ready key to the trend of American construction and American preferences now existing. They are compiled from the number of distinct styles of construction shown by the vehicles on exhibition opening night. That is, the cars enumerated include the different makes and the different models of each make when there is constructional difference between such models. Different patterns of one make and of the same construction are not included, as a table compiled from the whole number of vehicles displayed would create erroneous impressions concerning the tendencies in construction—owing to the fact that some exhibitors representing a certain system of construction might have more vehicles on the display floor than other makers representing a contrary system of construction, and thus the percentages would be altered from their correct ratio.

THERE ARE DISPLAYED

11 constructionally distinct styles of Steam Cars.

8 constructionally distinct styles of Electric Cars.

65 constructionally distinct styles of Gasoline Cars.

84 constructionally distinct styles of all types.

Of These

69 have wood wheels, 11 wire wheels, 4 tubular wheels.

50 have detachable tires, 23 single tube tires, 2 solid tires.

42 have angle or channel frames, 21 tubular frames, 8 wood frames, 13 frames of special construction.

55 have wheel steer, 27 lever steer.

A Composite Steam Car

with specifications chosen by the majorities and pluralities of certain types of construction would have

Wood Wheels,
Detachable Tires,
Tubular Frame,
Lever Steer,
Automatic Fuel Regulator,

Fire Tube Boiler,
Boiler Under Body,
Engine Under Body,
Automatic Air Regulator,

Pilot Light,
Automatic Lubricator,
No Condenser,
No Steam Water Pump,
Automatic Water Regulator,

A Composite Electric Car

whose specifications are secured in the same manner would have

Wood Wheels,
Single Tube Tires,
Tubular Frame,

Lever Steer,
Low Voltage Motor,
Chain or Gear Drive,

Single Motor,
Divided Battery,
Motor Under Body.

A Composite Gasoline Car

whose specifications are secured in the same manner would have

Wood Wheels,
Detachable Tires,
Angle or Channel Frame,
Wheel Steer,
Single Chain Drive,

Vertical Motor,
Two Cylinders,
Batteries for Ignition,
Motor in Front,

Mechanical Lubrication,
Automatic or Suction Inlet
Valve,
Sliding Gear Transmission,
Spur Differential.

MOTOR AGE

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SENSIBLE SHOW STORIES

The New York and Chicago automobile shows have become highly important fixtures in the trade. It is accordingly fit that the manner in which they are reported, especially by the trade press, be well considered. There are old lines of show reporting which are all right and there are other time tried methods which are all wrong. Chief among the latter is the customary habit of some publications of making a show story nothing but one conglomeration of long winded jollies. Show stories long enough to consume several hours of the reader's time have been printed, in which the only prominent fact brought out was that each exhibitor had the best display at the show.

The chief usefulness of such reports has been to provide work for type compositors, proof readers, etc., and to more or less introduce a fine line of superlatives to a class of readers looking for automobile facts. The automobile trade journal is not a correspondence school of rhetoric—neither does its usefulness and value to the trade lie in the direction of conscientiously endeavoring at each show season to furnish a stated number of lines—perhaps the proverbial "stickful"—of equally good words for all exhibitors.

It may have been a kindly spirit which has prompted such ventures in the past or it may have been a desire to help along the business office of the publications through the editorial departments. The distinction is valueless, for in either case it is evident that the reader of the paper has been left out of the consideration entirely. The reading pages of any publication are supposed to be prepared and printed

for the benefit of the subscribers. It is too much to ask of a reader that he wade through pages and pages of descriptions of exhibits, if these descriptions contain nothing more interesting than kind words.

A show story is a substitute in the reader's mind for a visit to the show. It should present facts—facts about the whole trade; facts which without a great lot of study and comparison and calculation and discrimination on his part can be thoroughly appreciated and digested.

The day of writing show stories in the form of a whole lot of show stories each of which is written especially and exclusively for the edification of an individual exhibitor is past. It is touring cars to runabouts that the trade does not care for this sort of thing. It is an absolute certainty that the reader learns nothing of value either to him or the exhibitor from it. It is a policy of the past, outgrown by the rapidly maturing industry. The trade and the readers now deserve sensible stories of the big shows.

EARLY ORDERS

Every indication points toward demands for early deliveries of automobiles which cannot be made by the manufacturers. Nearly every manufacturer reports the receipt of orders from individuals and agents at a rate which threatens to consume the entire season's output within a short time. There is no danger of over-production of this season's models.

It is obvious that to secure the early delivery of an automobile orders must this year be given as soon as possible after the purchaser decides upon the type and make of machine he will buy. It is also obvious that he must hurry up in his selection. There are a lot of fellows who perhaps wish to delay ordering in the hope of profiting by their neighbor's early season experience. This process of caution is all right if the buyer wishes to wait a few months for his car. If, on the other hand, he desires to spend the whole spring and summer in motoring he cannot wait for the experience of others with 1903 models to decide his own purchase. He must take a chance himself.

There are in the market a great many machines of established reputation—cars which have been made and sold for years and the buyers of which one year repeat their purchase the next season. The prospective customer can buy one of the well known cars if he is lacking in faith in the cars of a younger growth. He is either bound to do this or to use his common sense and judgment in selecting a new car early in the season; or he is bound to wait several months for the delivery of his machine.

Automobiles will not be sold this season on the short order restaurant plan. There will be no "Take away your tonneau" within 5 minutes after the salesman has accepted the order. The whole country is awake to automobile. The number of prospective buyers is growing rapidly, for the majority of the people have realized that the automobile is in reality the future carriage of economy and no longer the toy of the rich only. The average maker will soon be buried with calls for machines ordered before this and it is thus wise for the man who has not yet ordered to do so with as little delay as possible, if he expects to use his machine during the early part of the season.

Dealers especially should place their orders before the two big shows are over. The dealer

is the man who most commonly faces the buyer that wants the automobile quick, and quicker if possible, and he should for the sake of his business provide himself with sufficient stock or requisitions for stock to be able to hand the cars over without delay to the individual purchasers. Otherwise he may contract for more than he can deliver and find himself with a daily string of impatient buyers to face with all manner of excuses in the endeavor to hold trade.

INSTRUCTING THE WORKMEN

The better understanding of the general principles of construction and operation of automobiles—a thorough knowledge of the purposes and value of the different component parts—is without question desirable among the growing number of automobile mechanics. That at least its own employes, whether they be assemblers or machine tool operators, may know what they are making and why, what they are doing and for what purpose, the Packard Motor Car Co., of Warren O., has instituted what is probably the first school for automobile employes in this country.

Regular classes have been formed in which the subjects of automobile theory, practice, construction and design are fully and plainly discussed. These were organized in the hope that they would attract some of the more enterprising members of the working force, but the expectations of the company were more than realized, for the attendance from the first averaged over sixty and the project is now firmly fixed as a feature of the establishment. In addition to the classes a library has been inaugurated, in which current and standard motor literature will be kept that the workmen may become familiar with the steady progress of automobile production. It has been found in every way that this educative feature of the Warren plant is successful and valuable.

This move on the part of the Packard company to increase the efficiency of its working force by assisting in the creation of a greater interest in the goods being produced, is along the lines which are being followed by the best machine manufacturers of other branches. Several of the largest factories in the country are equipped with libraries and maintain classes, etc., for the instruction of the workmen. It represents the modern system of conducting the modern manufacturing plant. The introduction of such methods in the automobile trade is auspicious and desirable, especially in view of the fact that the automobile as a class of machinery is far less well understood generally than the ordinary kinds of machine structures.





ture. It is to be sincerely hoped that the steps taken at the Packard plant will lead to fuller development of the fundamental idea and that the same idea will spread rapidly to other plants.

A CONVENTION IN DETROIT

An international conference upon the subject of good roads will be held in connection with the annual meeting of the American Road Makers, called by the president, State Senator Earle, of Detroit, to meet in that city on February 13 and 14. Representatives from several Mexican states, the provinces of Canada and every state in the union will be present.

The general topics for discussion will be the proposed plan for inter-capital-connecting improved highways in the United States, Canada and Mexico, to be constructed and maintained by the co-operation of the federal, state, county and township governments, and, further, the bill which is now before congress, introduced by Mr. Brownlow, of Tennessee, providing for the creation of a bureau in the department of agriculture, involving an appropriation of \$20,000,000 for the purpose of co-operating with the various states, counties and townships throughout the union in the construction and maintenance of public highways.

In view of the great importance and magnitude of the subject, it has been thought advisable by the executive committee of the American Road Makers to assemble an international conference of public officials and prominent good roads advocates. To this end, President Roosevelt, who has expressed hearty sympathy for this needed reform, has been invited to be the guest of the road makers on that occasion and to deliver the principal address. The members of both houses of congress, the governors of all the states and territories and Canadian and Mexican officials have been invited to be present. Governor Bliss and both houses of the Michigan state legislature have already accepted invitations to be present on that occasion, and a special train will be run from Lansing to Detroit to permit of their attendance and participation in this important conference.

Besides the various state and county good roads organizations, of which there are a large number at work throughout the country, automobile club associations and similar organizations will be invited to send delegates to this conference. The New York and Chicago Road Association, the Connecticut Valley Highway Association, the Automobile Club of America have already signified their intention to be represented.

PATRONS OF THE SHOW

An automobile show attracts various kinds of persons. This automobile show is getting its due share of diversity in the matter of patrons. Many objects bring many visitors. There are dealers who come to secure agencies, mechanics who come to glean ideas, club men who come to see if there is anything better than their present machines; prospective purchasers who come to get a general line on the market; decided purchasers who come to place

orders; jobbers who come to make arrangements to handle lines of parts and fittings; small builders who come to buy parts, etc.; New Yorkers who come because it is "the thing;" other New Yorkers who come because it is at Madison Square Garden, still others who come because they wish to keep abreast of the automobile industry even though they are not immediately to become automobilists, and possibly a few others who stroll in because the show furnishes a novelty and a chance for entertainment.

Of all these various classes of visitors which benefits the trade most? The answer is not as readily apparent as would seem, on account of the fact that often the best advantages are not the most direct and immediate. From a standpoint of quick results the trade is most

benefited by the dealers and the individuals who are at the show to buy. But while these classes are potent influences in the show's success they are not the only ones which enhance the show's benefit to the whole industry.

The growth of the automobile industry depends largely upon the growth of popular interest in the automobile, and even the curiosity seeker who wanders into the show with but a hazy idea of what he is going to see, serves a purpose. The show is a missionary project. It creates interest in automobiles. Who can tell of the thousands who come and go how many will by the time of the next show, or the next, or even the next, have ripened into ardent automobilists? Who can tell from how many mouths may be dropped words relative to a visit to the show that in other minds sow the seed of automobilism?

No show visitor is so unimportant as to be worth while only for the price of the admission he has paid. The buyers of one year's show may in many cases have been the curiosity and entertainment seekers of the preceding show.

Every visitor, every line of daily paper mention; every line of trade journal comment that is printed concerning the show; everything which in any way turns eyes upon the show, is of future value to the industry and the sport. The show sustains interest directly and makes new interest both directly and indirectly.

One of the most rapid pieces of construction of motor cars in this country has just been put through the Conrad Motor Carriage Co.'s works at Buffalo. Its Mr. Atterbury during a recent visit to London met with W. H. Kitto of the Kitto Automobile Co., Ltd., of Bush Lane House, Common Street, E. C., and talked business. Mr. Kitto arrived at Buffalo January 3, with specifications and saw the work well in hand. He left for Chicago and Cleveland and on returning to Buffalo on January 13 found the work well advanced. By the sixteenth the new carriage was assembled and had the first coat of paint. The machine will leave this week to catch the *Lucania* and be on exhibition at the British Automobile Show to be held at Crystal Palace, London, from January 30 to February 5. Mr. Kitto is at the New York show looking out for goods and specialties for his company. The Conrad company realized that Mr. Kitto knew what was wanted for the British market and will build cars to his specifications, which are up to British and French ideas. That the car will cause a flutter on the other side is the opinion of all who have seen the chassis and carriage work.

Recently a committee of Italian parliament members submitted to the minister of public works a request that the government give subsidies to automobile omnibus services for the transport of both passengers and merchandise to and from towns not reached by railroads. The request was well received and, it is stated, was approved by even the king. It is probable that this class of service will spread rapidly throughout the country.



EDWIN F. BROWN

To Chicagoans Mr. Brown is known as an enthusiastic automobilist of long standing, who bears the distinction of having built his first motor car—a steam tricycle—and as a member of the Chicago Automobile Club. To the whole automobile fraternity he is or should be known as the president of the American Motor League, the association which was incubated by Charles E. Duryea, and which was given a formal organization at the last automobile show in Chicago. At this meeting Mr. Brown was elected president.

The American Motor League stands between the local clubs and the American Automobile Association in usefulness. The former brings the automobilists of the respective vicinities together, while the latter cements for further benefit and usefulness the various clubs of the country. The American Motor League unites the individual automobilists all over the country into one body. It is built on the lines of the old and once mighty L. A. W., the federal organization of cyclists. It is perhaps small but with a steadily growing membership, and it is intended to instill new enthusiasm in its chief projectors at the annual meeting held this week at Madison Square Garden. It is without doubt an association of great future value.

SURPRISING TRADE ON THE COAST

Los Angeles Rapidly Becoming a Great Automobile Center—Many Stores and Several Exclusive Garages—All Have Plenty of Trade—Sell Machines as Fast as They Can Get Them from Makers

Los Angeles, Cal., Jan. 17.—No other city of 100,000 population has purchased as many or used automobiles as extensively as Los Angeles. Probably no city of twice the size has three-quarters as many machines in use as there are here. Of the more than 250 automobiles owned in Los Angeles hardly a single one has been purchased for pleasure alone. A few of the electrics are owned by people who use them as they would a private horse carriage, but the majority of automobiles in this city are used for business purposes or by business men. One can go along the business streets at almost any hour of the day and count from two to a dozen in a single block, and it is not unusual to see horses and autos crowded together in a manner as could be imagined.

There are now ten firms in this city dealing in automobiles exclusively and nearly a half dozen bicycle and sporting goods houses that also sell automobiles. There are five garages and two exclusive repair shops besides those connected with the garages.

OLDS SELL READILY

The Oldsmobile outsold all makes the past season, Crippen & Church disposing of over seventy-five up to the time E. R. Crippen retired from the firm several months ago. At that time they had about a score of machines on hand, most of which have since been sold

by Mr. Church, who succeeded to the business.

Norman Church has been pushing the St. Louis and Packard gasoline cars and the National electrics. Of the Packards nearly a dozen touring cars have been sold in this city and Pasadena, which is but ten miles away. A half-dozen or more of the "rigs that run" are also in use, while the Nationals begin to be a common sight on our streets.

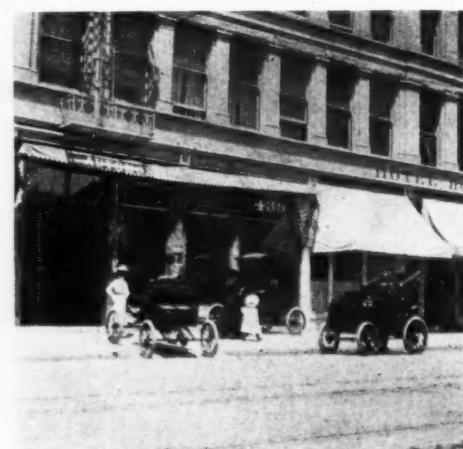
W. K. Cowan, the Waverley and Rambler agent, probably ranks second in volume of business here the past season, as he has sold



W. K. Cowan



H. D. Ryas



MOTOR AGE

Norman Church

tunate of any local dealers in many ways. Chas. J. Heineman, who came here from San Francisco about a year ago as coast representative of the American Electric Vehicle Co., with a good stock of delivery wagons and stanhopes, enjoyed a prosperous business from the start and was able to obtain convenient and roomy quarters with the Electric Auto Livery on Main street. He afterward secured his present quarters on the southwest corner of Main and Seventh streets. It was a one-story brick building at least 60 feet square and with a large back yard. The building had been built for an electric works and was therefore already wired and easily changed into a garage for electric carriages. Mr. Pratt joined Mr. Heineman about the time he moved into his new quarters and then the latter went east and captured the Autocar agency for this coast.

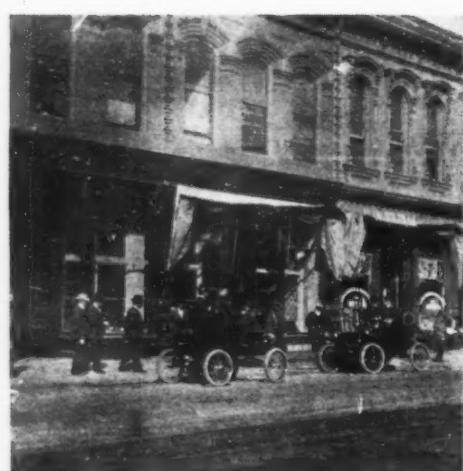
When the little touring cars arrived it was necessary to build an addition that filled the whole back yard, thus doubling the room. Heineman & Pratt now have a model establishment and have already sold several car-loads of Autocars. Mr. Heineman also made a ten strike with electric delivery carriages, selling a dye establishment five and securing orders from laundries, department stores, druggists, etc., for about a score more.

THE LOCOMOBILE LINE

The local branch of the Locomobile Co. of the Pacific made a big record 2 years ago with the Locomobile and then, aside from its big repair trade, did little until Llewellyn H. Johnson, formerly an extensive bicycle dealer in East Orange, N. J., took charge here and secured the Winton and Long Distance agencies. The company has all of California for



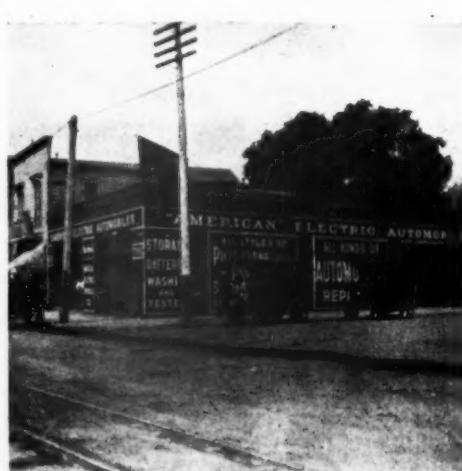
Electric Auto Livery



Los Angeles Auto Co.

about fifty Waverleys in less than two years, and being unable early this season for nearly five months to obtain Waverleys fast enough from the factory, many of his customers bought Oldsmobiles in preference to waiting. Probably twenty sales were lost in this way. He was also badly crippled in delay with the Rambler gasoline car, not being able to secure the second car until last fall. At present he complains bitterly over the delay in getting cars from the east. Last week when his fourth Rambler arrived there were three customers willing to pay a premium to get it, although it was already sold. Mr. Cowan is now arranging to build so as to have more roomy quarters and do a livery and repair business as well as to keep a large stock on hand.

Heineman & Pratt have been the most for-



Heineman & Pratt

the Panhard, Winton and Long Distance machines. There was some friction first over the Winton, as a local machine shop had the coast agency but did little work with it. Mr. Johnson has sold five or six Winton touring cars, which was all that could be secured from the factory, and there is now a large waiting list. A number of Locomobile touring cars have also been sold here, besides the regulation Locomobile.

The Mobile Co. of America has opened a coast depot here and has a large stock of machines in the new store on South Broadway.

The local branch of the 'Frisco agency of the White steam carriage has done an excellent business. Mr. H. D. Ryas is in charge and can sell the Whites faster than they arrive. Like Heineman & Pratt the White agency secured roomy quarters on Seventh street just before it was paved with asphalt and thus secured a good location with cheap rent.

AT A SPORTING GOODS HOUSE

The Tufts-Lyon Arms Co., the oldest established sporting house in southern California, has at last added automobiles to its line and established a roomy automobile salesroom in the rear of the big store on Spring-street. It carries the Buffalo, the Spaulding, the Northern and the Toledo steamer.

The newest automobile establishment in Los Angeles, except the Mobile branch, is the Los Angeles Automobile Co., composed of G. T. Stamm and his two sons, F. B. and George T. Stamm. They have had a machine shop and bicycle store in Ontario, Cal., for years and have built several gasoline automobiles besides making a specialty of gasoline engine work. The company has opened a large garage and retail salesroom at 109 North Main a lease on the store adjoining, so that the rear, in another large building. The firm has a lease of the store adjoining, so that the establishment can be enlarged when necessary.

ONE MAKER BUSY

Out at its automobile factory the Auto Vehicle Co. is finishing a lot of fifty of its new touring cars with double cylinders engines of 7 horsepower. It has only one machine in use.

There are but two exclusive livery establishments. The garage on South Broadway stores and repairs machines only.

The Electric Auto Livery on Main street is now owned by Dion Geraldine and in addition to caring for about thirty automobiles, most of which are electric, he keeps two tally-hos, three breaks and several single seaters to rent; and also buys and sells automobiles on commission, etc.

Sam Sturgis & Bro. were the first parties in this city to build an automobile, and for that matter among the first west of Chicago. Sturgis' first machine made its appearance in 1897 and was a success. An automobile factory was to have been built at that time but financial litigation tied up the patents and the two model machines, until about a year ago, when the original machine was sold for storage by the warehouse which has had the custody of it. Sam Sturgis went to work and at odd times during 1900 and 1901 built another automobile on entirely new ideas, which he has used since and rebuilt twice. First it was a sort of victoria, then he made it into a neat break, and now it is a surrey. He is preparing to turn out a new style of gasoline car to be known as the "Rocket."

OHIO DELEGATION IS LARGE

Cleveland Sends a Big Representation of Tradesmen to the Show—Current Ohio Trade News

Cleveland, Ohio, Jan. 19—Cleveland's representation at the big Madison Square Garden show this week will be on a plane with its standing in trade. There will probably be more people from Cleveland than any other city except New York. A large party left Friday afternoon over the Lake Shore to assist in getting exhibits in shape, and another party left Saturday to be there in good shape for Monday morning.

CLEVELAND WELL REPRESENTED

Among those who were in these two parties were the following: Alexander Winton, George Brown, Thomas Henderson, Charles B. Shanks and M. Milenowsky of the Winton Mortor Carriage Co.; L. H. Kittredge and L. H. Mooers of the Peerless Motor Car Co.; Windsor T. White and Rollin White of the White Sewing Machine Co.; Frank Dorman, George McKay and Col. Pardee of the American Motor Carriage Co.; F. B. Stearns and C. McCrea of the F. B. Stearns Co.; A. L. Moore, J. E. Edwards and Robert Deming of the Cleveland Automobile Co.; L. E. Hoffman and Archie McLaughlan of the Hoffman Automobile Mfg. Co.; W. E. Penning, J. H. Thompson and James Dixon of the General Automobile & Mfg. Co.; Otto Konigslow of the Konigslow Co.; Walter Baker, M. G. Goss, Fred White and W. E. Denzer of the Baker Motor Vehicle Co.; H. S. Gorton and W. H. Pierong of the Standard Welding Co.; Philip Dorn of the American Ball Bearing Co.; Mark Moffett of the National Carbon Co.; J. Jardiens of the Berg Automobile Co.; Charles W. Mears, of Automobile Topics; George Collister and W. F. Sayle of Collister & Sayle; Macey Wright of the Cleveland Automobile & Supply Co.; Charles E. Weaver of the Kelly Handle Bar Co.; David Troxel of the Troxel Mfg. Co., Elyria; George Blackmore, J. C. Burroughs and W. E. Robinson of Painesville; Louis Mueller and R. R. Owen.

CLEVELAND TRADE BREVITIES

Louis Mueller, formerly a prominent bicycle builder and dealer, has gone to the show with view to securing the agency for a number of lines of parts. He proposes to handle parts and supplies of all kinds and will probably assemble a few machines. He has the agency for the Hully engine in this city.

E. P. Walker, superintendent of the retail department of the White Sewing Machine Co., died last Tuesday. Mr. Walker was 61 years of age, a veteran of the civil war and a prominent G. A. R. man. He had been with the White company for many years.

The Ohio Oldsmobile Co. was incorporated last week with \$10,000 capital by R. R. Owen, W. D. McGaugh, P. R. Fahey and H. H. Hudson. This is the company which has succeeded the old Oldsmobile Co. that maintained headquarters in New York under the management of R. M. Owen, a brother of the present Cleveland manager, R. R. Owen. The new concern has no connection with the old.

J. Raymond, of the B. F. Goodrich Co., visited the Winton factory last week to confer with Mr. Winton relative to the special tires to be made for the new Winton racer.

The American Ball Bearing Co. has increased

its capital stock to \$100,000 and is planning to make a number of improvements and extensions made necessary by the remarkable growth in its business. This growth is accounted for largely by the prominent part which the concern bears to the automobile industry. As is generally known, the American company supplies its Baker ball bearings and artillery hubs to a large number of the leading makers.

IN OTHER OHIO TOWNS

The Geneva Automobile & Mfg. Co. of Geneva has increased its capital stock from \$100,000 to \$150,000. J. A. Carter is president and Henry Means secretary. The company is planning a number of improvements and extensions.

Citizens of Oxford, Ohio, are organizing a company to operate an automobile bus line between Oxford and Hamilton. They are on the market for large automobiles capable of carrying 16 passengers.

The India Rubber Co. of Akron is planning a large addition to its plant. Work on the building will start as soon as possible and the former capacity will be doubled.

The Balancer Automobile Co., of Xenia, Ohio, has purchased a factory in that city and is installing machinery to commence the manufacture of automobiles. The company has completed several experimental machines and has a number of good orders.

EUROPEAN EVENTS

Below is a list of the principal automobiling events arranged in Europe for the coming season:

Stanley show, London, January 16 to 24.
Crystal Palace show, London, January 30 to February 7.

Liverpool show, February 3 to 7.
Edinburg show, February 6 to 14.
Brussels show, February 7 to 16.

Timekeeping competition, Automobile Club of France, February 9.

One hundred kilometer consumption test, organized by the Auto-Velo, Paris, February 19.

The "Pau Week," southern France, February 22 to 28.

Berlin show, March 8 to 22.
Vienna show, March 16 to 30.

Cordingley show, Agricultural Hall, London, March 21 to 28.

Transport Criterium, Paris, March 21 to 28.

The "Nice Week," France, March 28 to April 5.

Stockholm show, May.
St. Petersburg show, May.

Paris-Madrid road race, May 24.
Automobile congress, Paris, June 22 to 24.

Circuit of the Ardennes, Belgium, August.

Stelvio hill climbing contest, Italy, August.

Leipzig show, October 15 to 21.

PARIS SHOW AWARDS

The official awards at the late Paris automobile exhibition are as follows:

PRIZE FOR BEST APPEARANCE.—Diplomas and gold medal, given by the Automobile Club of France, Charron, Girardot and Voight; gold medal, given by the Chambre Syndicale Automobile, Mors; gold medal, given by the executive committee, Panhard and Levassor. Diplomas and gold medals to the following: De Dion, Delahaye, Societe Parisienne, Renault, Daimler (Paris), Gobron Brillie, Pipe, Wolseley, Napier, Georges Richard, Rochet Schneider, De Dietrich and Peugeot. Diplomas and silver

medals to the following: Delaugere, Darracq, Herald, Societe Decauville, Rochet, Clement, Societe Benz, Gladiator, Ader, Ateliers Ducommun, Sage and Societe Minerve. Diplomas and bronze medals to the following: Dewald, A. Lambert, Bouhey, Moto-Bloc, Henriod, Gillet-Forest, Otto, Boyer, Societe Automotrice, Cottreau, Fabrica Italiana di Automobili, Bardon, Societe Belgica, Vinet.

SECTION OF ELECTRICITY.—Diploma of honor and gold medal, prize given by M. Dufayel, Societe Francaise d'Automobiles Electriques. Diplomas and gold medals to the following: Electromobile, Krieger, Electromotrice. Diploma and silver medal: Ch. Milde et Cie.

SECTION OF STEAM CARS.—Diploma of honor, prize given by the Chambre Syndicale du Cycle et de l'Automobile: Gardner-Serpellet. Diploma and silver medal: Chaboche. Diploma and bronze medal: Locomobile.

AUTOMOBILE AGENCIES.—Diploma and silver medals to the following: Paris-Automobile (Rabourdin), Auto-Generale (Salleron), and l'Intermediaire (Loysel). Diplomas and bronze medals: Garage Guibert, Auto-Palace and Comptoir Parisien.

COACH WORK AND UPHOLSTERY.—Diploma of honor: La Carrosserie Industrielle. Diplomas and silver medals: Vicart, Wherle and Godard-Desmarest. Diplomas and bronze medals: Lamplugh and Driguet.

DEATH OF COMPANY'S HEAD

The Chicago Handle Bar Co., of Chicago, announces the sudden death of its founder and late president, George W. Webster. Mr. Webster's death occurred at Los Angeles, Cal., January 10, as the result of pneumonia. The policy and general conduct of the business will continue on the lines formulated by Mr. Webster.

A SHOW FOR BUFFALO

Buffalo, N. Y., has caught the show influenza and will add to the efforts of Cleveland, Philadelphia, Detroit and other middle-weight cities to popularize the local show. The Buffalo exhibition will be held during the second week in March. Convention Hall has been secured for the event.

This building presents an entirely clear floor space of 124 by 182 feet and is centrally situated. The show is to be given under the auspices of W. C. Haynes, of the W. C. Haynes Automobile Co., while the active management will be in the hands of F. J. Wagner. Buffalo is a good automobile town actually and prospectively, and has a prosperous surrounding territory to draw on for additional sales.

HEATH LEAVES WISCONSIN

S. F. Heath, who has for 31 years been known to the trade as sales and advertising

manager of the Wisconsin Wheel Works, of Racine, Wis., has retired from that position. Mr. Heath's earnest efforts are greatly responsible for the wide recognition of the qualities of the Mitchell motor bicycle. His experience in this connection would render his services valuable to almost any motor or automobile company. Mr. Heath expects to become associated with some such concern at the New York show this week.

BODIES KEPT IN STOCK

The National Motor Vehicle Co., of Indianapolis, Ind., has received visits from agents from all parts of the United States within the past 30 days. As a result the number of orders entered on the company's books for early delivery is gratifying and the factory will this season be devoted exclusively to the building of National automobiles. Extensive improvements have been made, new machinery bought and installed, and particular attention has been paid to providing excellent facilities for the finishing department. Hundreds of bodies have been put in stock, so that they will have a sufficient length of time to enable the finish to properly harden before delivery.

ACCOMMODATING MANAGEMENT

The first international automobile show in Sweden will take place in May at Stockholm. Entries will be received until April. French manufacturers have already decided to be strongly represented, and no doubt Germany will also have several large exhibits, as the Swedish market seems to be a promising one. There will be no charge for space, and the management will insure all exhibits gratis. The committee take entire charge of all customs matters.

STEERING CONNECTIONS

A trade addition is a set of steering connections that has been placed on the market recently. These connections are drop forged steel, well adapted to the purpose, and are machined and hardened so that they reach the automobile manufacturer practically ready to apply to the vehicle. These connections are listed by the manufacturers in detail, so

that users can obtain complete sets or the individual parts as may be desired. They are manufactured by the Billings & Spencer Co., of Hartford, Conn., under a Copeland patent, and are carried in stock for immediate shipment.

MELANGE OF TRADE BREVITIES

The Springfield Automobile Co., of Springfield, O., is among recent incorporations.

The Neftel Automobile Co., of New York, has been incorporated with a capital of \$75,000.

The National Motor Car Co., of Wilmington, Del., has been incorporated for \$250,000.

The Motor Storage & Mfg. Co., of Chillicothe, O., is preparing to erect a new factory building.

The Electric Transit Co. has been incorporated for \$5,000 to operate electric carriages in New York.

Honoré Palmer, president of the Chicago Automobile Club, has ordered a 60-horsepower Mercedes for use this season.

The International Motor Car Co., of Toledo, Ohio, presents the new Toledo gasoline and steam cars in an advance booklet.

The H. L. Hoffman Motor Co., 30 West Randolph street, Chicago, will exhibit its automobile motors at the Chicago show.

The Central Automobile Co., of New York, known as an importing company, has been incorporated with a capital of \$150,000.

E. H. Bothin has asked for a municipal franchise to operate a line of passenger automobiles in San Francisco. He is ready to invest \$20,000 in vehicles and will establish a 5-cent fare.

The charter members of the automobile club of New Orleans met last week to perfect the organization and to discuss means whereby rational city ordinances for the regulation of automobiles might be secured.

The bankruptcy court of New York has appointed J. C. Coleman receiver of the German-American Automobile Co., upon the petition of the company's treasurer. This action is

the result of trouble among the members of the company. No report has yet been made.

W. M. Banschbach, a veteran cycle dealer and repairer of Princeton, Ill., has recently installed a dynamo for charging electric automobiles, and announces that whenever any out-of-town rigs come by he can give them all the 110-volt current they need.

The Robinson touring car, made by the Pope-Robinson Co., of Hyde Park, Mass., is sensibly described and artistically illustrated in one of the new sort of high-grade booklets which are becoming marks of quality for the automobile trade.

LATEST DEVELOPMENT OF THE PASSENGER TRANSIT CAR



TROLLEY AUTOMOBILE USED IN EUROPE

Before Buying
Examine...

THE WHITE

Steam Touring Car for 1903

THE WHITE is a Steam car, with the distance of a Gasoline and the ease of operation of an Electric. ∴ In the 500-mile Reliability Contest from New York to Boston and return, arranged by the Automobile Club of America, three **White Steam Stanhopes** covered the distance without stop or trouble of any kind—a perfect performance.

The WHITE STEAM GENERATOR

is absolutely non-explosive, gives pressure in five minutes from cold water, and once in motion is self-regulating. The same motive power which has been so successfully used in former White models will be used in the new Touring Car.

Write for full particulars, including Prof. Thurston's report on our Steam Generator, and the official reports of important endurance contests.

SPECIFICATIONS:

Seating capacity...Four
Rated Horsepower..Ten
Engine.....Compound
Wheel Base....6 ft. 8 in.
Tread.....4 ft. 8 in.
Wheels.....30 inches
Tires (Goodrich Clincher).....4 inches
Weight (tanks filled).....1650 lbs.
Extreme Length...10 ft.
Extreme Width.....5 ft.
Extreme Height.5 ft. 3 in.
Capacity of Gasoline
Tank.....10 gals.
Capacity of Water
Tank15 gals.

EQUIPMENT:

Condenser, Side Lamps,
Set of Tools, Horn, Tool
Case.

PRICE
\$2,000.

WHITE SEWING MACHINE CO. (Automobile Department) ∴ CLEVELAND, OHIO

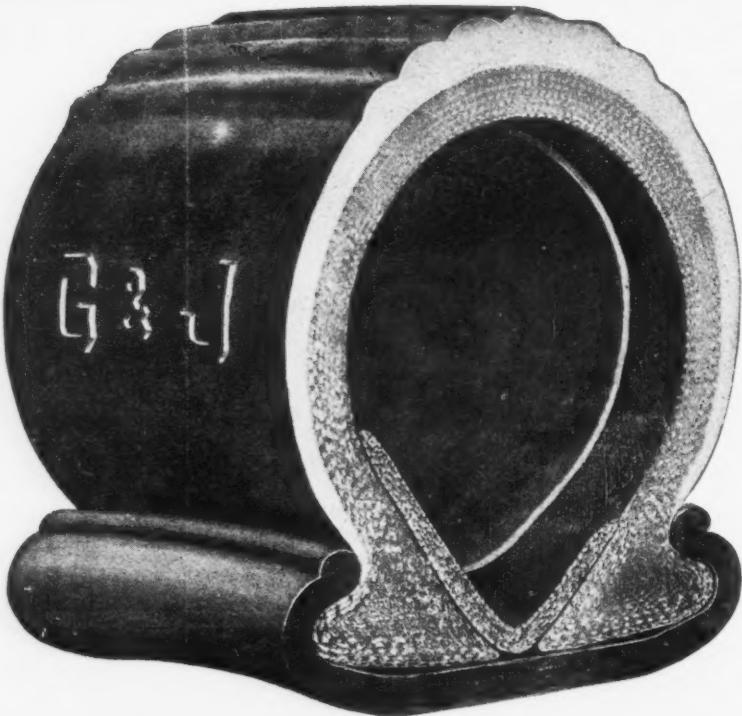
22 Union Square, New York, N. Y.
509 Tremont Street, Boston, Mass.
300 Post Street, San Francisco, Cal.
12 Woodward Avenue, Detroit, Mich.

5979 Centre Avenue, East End, Pittsburgh, Pa.
Bankers Brothers Company, Cor. Vine and Broad Streets, Philadelphia, Pa.
Walter C. White, European Representative, 19 Princes St., Westminster, London, England.

609 Main Street, Buffalo, N. Y.
300 Rose Bldg., Cleveland, O.
4259 Olive St., St. Louis, Mo.
1781 Stout Street, Denver, Col.

G & J TIRES

Make the most practical and satisfactory automobile equipment. They will stand hard service; are resilient and speedy; easily repaired if punctured—and they don't puncture easily.



Detachable tires are being adopted by all automobile makers for 1903. G & J automobile tires stand at the head of the class as reliable tires of unquestioned quality.

New York Show: Jan. 17-24. Chicago Show: Feb. 14-21.

G & J TIRE CO.
INDIANAPOLIS, IND., * * * U. S. A.

Good Advertising

Is that
which
reaches

the **RIGHT MAN**
at the **RIGHT TIME**
in the **RIGHT WAY**



WE

believe in
advertising,
and in
our own
medium.
Let us figure
with

YOU



Advertising placed in

Motor Age

will be GOOD ADVERTISING

Specially attractive numbers, the
shows, preparations for the opening
season, large pages, splendid typog-
raphy, unsurpassed illustrations and
broad, guaranteed circulation

COMPEL ATTENTION.

MOTOR AGE, Monon Bldg., CHICAGO

See our 1903 platform on the other side.

PLATFORM FOR 1903

TO PUBLISH A BETTER PAPER EACH WEEK;
TO WARRANT THE CONTINUED EXPRESSION
OF SUCH APPROVAL AS THE FOLLOWING:

NATIONAL VEHICLE CO., INDIANAPOLIS, IND.
We acknowledge receipt of the new MOTOR AGE. We consider it a most creditable publication—typographically, editorially and from an advertising standpoint. A glance through its pages shows it to be the representative paper of the trade and a credit to the industry in whose interests it is published.

STUDEBAKER BROS. MFG. CO., CHICAGO.
Allow me, as an old reader of the MOTOR AGE, to congratulate you on the appearance, etc., of your January 1 issue. It certainly is a credit to the automobile industry and anyone who may be interested in same will find this journal a most valuable and interesting publication to have in their possession.

THOMAS B. JEFFREY & CO., KENOSHA, WIS.
We are just in receipt of your issue of this date and hasten to extend our congratulations on the greatly improved make-up of your paper. We consider it a more convenient size and the improvement in quality and typographical work cannot help but bring you an increase in subscriptions and advertisers.

THE PEERLESS MOTOR CAR CO., CLEVELAND, O.
We have carefully looked over your new MOTOR AGE and think it a very great improvement over the old one, both as to size and appearance.

ELECTRIC VEHICLE CO., CHICAGO.
We have received copy of the MOTOR AGE in its new form and congratulate you upon its fine appearance. We shall soon be ready with some new announcements and illustrations which we think will still further add to the attractiveness of your pages.

PREMIER MOTOR MFG. CO., INDIANAPOLIS, IND.
We congratulate you upon the change you have made in your paper. It is certainly a decided improvement.

SALAMANDRINE BOILER CO., NEW YORK.
We are in receipt of your New Year's copy of the MOTOR AGE. It is certainly enlarged on a very handsome scale and is gotten up in a very fine manner.

GENERAL AUTOMATIC & MFG. CO., CLEVELAND, O.
We compliment you on your issue and with the new cover and increased size we certainly think you are now editing a valuable paper, and without a doubt you will increase from now on.

BRENNAN MOTOR CO., SYRACUSE, N. Y.
We are well pleased with your copy of 1903 MOTOR AGE, and believe it should be interesting to the readers and beneficial to the advertisers.

UPTON MACHINE CO., BEVERLY, MASS.
We take pleasure in saying that we consider your MOTOR AGE in its enlarged and altered style an improvement, from which you will no doubt reap the benefit.

THE BARTHOLOMEW CO., PEORIA, ILL.
In regard to the new issue of the MOTOR AGE we compliment you upon its very neat appearance and we think you have greatly added to the appearance of your paper by making this change and we are favorably impressed with it as a good, live paper.

KELLY HANDLE BAR CO., CLEVELAND, O.
Your New Year's greeting in the form of a very handsome copy of MOTOR AGE came to hand. It is quite attractive and the paper and printing are fine.

CENTURY MOTOR VEHICLE CO., SYRACUSE, N. Y.
The new number of MOTOR AGE is certainly superb and we believe that the new size and make-up will tend to draw a big clientele for your publication, and we believe that there is a big field for just such a number as you have just issued.

THE WINTON MOTOR CARRIAGE CO., CLEVELAND, O.
Many thanks for the effective and tasteful way in which our back page was set in January 1 issue of MOTOR AGE. The general effect of the new size is very good and the news columns are just as interesting as ever.

WESTFIELD MOTOR CO., ANDERSON, IND.
We think the change a great improvement and that it should be the means of greatly extending its patronage.

THE BADGER BRASS MFG. CO., KENOSHA, WIS.
We take great pleasure in congratulating you on the marked improvement you have made in your paper, both in size, make-up and matter, and we can assure you it will have our patronage with liberal space during the coming season. We note you are refraining from "write-ups," which we think is a very wise thing, as we thoroughly believe in detailed descriptions in place of glittering generality.

LINDSAY-RUSSELL CO., INDIANAPOLIS, IND.
We are in receipt of copy of MOTOR AGE with its new suit on, and think it is quite an improvement.

INTERNATIONAL MOTOR CAR CO., TOLEDO, O.
We are in receipt of MOTOR AGE and wish to compliment you on the appearance.

MATHESON MOTOR CAR CO., GRAND RAPIDS, MICH.
We are pleased to express our highest approval of the changes effected in the make-up of MOTOR AGE. It is certainly a very clean cut periodical now and we feel to quite a measure dependent upon its pages for the latest trade information in the most pithy and reliable form.

THE DIAMOND RUBBER CO., AKRON, O.
We consider the enlargement of the MOTOR AGE a great improvement.

THE HAYNES-APPERSON CO., KOKOMO, IND.
The new and enlarged edition of your journal reached us last week, and we certainly believe it is quite an improvement over anything you have previously turned out, both in appearance and contents. It is a very attractive number and should carry more weight with it than in the past.

THE B. F. GOODRICH CO., AKRON, O.
The new MOTOR AGE is all right and we have no hesitancy in pronouncing it a great improvement over the old.

FROM A NEWSPAPER EXPERT

Yesterday I was handed a copy of MOTOR AGE fresh from the press, and my first impression was "handsome." I took the copy home with me and today gave it careful, critical examination. From a mechanical point of view it is simply par excellence, there being nothing lacking to please the eye. The selection of type faces for headings and display ads. is admirable, and the composition throughout reflects credit upon the printers. The presswork is good, and that cover is simply immense. The reading matter would seem to me to be of such a nature as would win friends for the paper, and the volume of business indicates "something doing" in automobile affairs. My wish for you is the increased prosperity you so richly deserve.

THE MOTOR AGE

Monon Building,

Chicago



THE READERS' CLEARING HOUSE

DIFFERENT FORMS OF COILS

Akron, O.—Editor MOTOR AGE—I would like to know the difference between the trembler form of induction coil and the plain jump spark form. What advantage has the former over the latter, if any?—M. F. B.

In the trembler form of coil the contact is made and broken in the primary circuit a great many times during the period of ignition. The result is a stream of sparks of great intensity. In the plain jump spark coil only a single make and break occurs during the period of ignition, which gives only a single jump spark. The trembler form of coil requires more care and attention than the plain jump spark coil, and manufacturers and users of coils are divided in opinion as to which is the best form. If properly cared for, the trembler form should certainly give first-class results.

SPARK WANTED

St. Louis, Mo.—Editor MOTOR AGE—I would like to know what is wrong with the electric ignition on my motor bicycle. The primary circuit is in good shape and sparks at every contact; the secondary circuit sparks once in a while only, but when it does it gives a good spark. This, of course, causes misfiring in the motor cylinder.—S. W.

The probable cause of the trouble is either that the battery is run down or that the secondary winding of the coil has become disrupted from some cause or other. Try a new battery, and if this does not remedy the trouble the difficulty lies in the secondary winding of the coil.

MOTOR THROTTLING

Seattle, Wash.—Editor MOTOR AGE—Does the act of reducing the size of the charge in the combustion chamber of a gasoline motor by using a throttle in the inlet pipe from the carburetor, result in the creation of a partial vacuum in the cylinder during the intake stroke?—WILSON BARLOW.

This is the case, with the result that upon the return or compression stroke of the piston the compression is materially reduced and the explosion less powerful than when a full charge is drawn into the cylinder.

MAKING INDUCTION COIL

Indianapolis, Ind.—Editor MOTOR AGE—I wish to make an induction coil for a bicycle motor and wish to ascertain the following dimensions for it: Length and diameter of soft iron wire core; outside diameter of finished coil; quantity and size of wire for the primary and secondary windings; size of condenser and number of sheets of tin foil required. What length of secondary spark would this coil give?—B. S.

The soft iron wire core should be 6 inches long and $\frac{1}{8}$ of an inch in diameter; the outside diameter should be about $2\frac{1}{2}$ inches; there should be 8 ounces of number 16 B. & S. gauge double cotton covered wire for the primary and 12 ounces of number 36 B. & S. gauge single silk covered wire for the secondary winding. Make the condenser of forty

sheets of tin foil, with linen paper insulation between the tin foil, the tin foil being 6 by 4 inches, and paper insulation 5 by 5 inches. At least a $\frac{1}{2}$ of an inch plain jump spark, and a spark of about $\frac{1}{2}$ to $\frac{1}{4}$ of an inch if a vibrator is used would be secured.

MISFIRING MOTOR

Cleveland, O.—Editor MOTOR AGE—I have a motor made up from a set of castings. It is well made and the details are correct in every way. It does not fire properly, however, and will stop as soon as it gets its full compression, with the relief cock closed. How far apart should the platinum points of the spark plug be to give the best results?—T. G. B.

Disconnect the secondary wire from the spark plug and test the spark in the air. If it is under 5-16 of an inch long, the battery is either exhausted or the insulation of the plug defective, and the feeble spark given at the plug when in the cylinder is put out by the compression.

IGNITION METHOD

Princeton, Ill.—Editor MOTOR AGE—As a reader of your valuable paper I would like to ask a question. Is there any way other than the electric spark or hot tube to ignite the charge in gas or gasoline engines? If these is, please inform me as to how they work or what they are.—E. L. TRIMMER.

There are two other methods of ignition, but they are not much used. The first is what is known as catalytic ignition, in which a small piece of spongy platinum is rendered incandescent by the heat of the combustion of the charge. The second is the form employed in the Diesel type of gas engine, in which the compression is carried to such a degree as to cause spontaneous combustion, or self-ignition, from the heat generated during the compression of the charge.

KEROSENE MOTOR

Ottawa, Canada—Editor MOTOR AGE—Can you inform me through the columns of MOTOR AGE whether there is a motor bicycle made that will operate with kerosene instead of gasoline? Kerosene can always be obtained, but gasoline is hard to find in remote places.—B. L. H.

Such a machine is not now on the market. A carburetor that will successfully utilize kerosene has yet to be perfected.

FORMS OF ELECTRICITY

Springfield, Ill.—Editor MOTOR AGE—Is the electricity generated by a magneto or dynamo the same kind as that supplied by a storage or dry battery?—H. F.

Electricity or electrical energy can be generated in several ways—mechanically, chemically and statically or frictionally. By whichever means it is produced, there are many properties common to all. There are also distinctive properties. The current supplied by a storage battery will flow continuously until the battery is exhausted; while the current from a dry battery can only be

used intermittently—that is, it must have slight periods of rest, no matter how small.

The magneto or dynamo current is of an alternating nature, or one which reverses its direction rapidly. In use it is changed into a current flowing in one direction only, by means of a commutator. Any of the three methods are capable of exploding or firing a charge of gas and air in a motor cylinder, but static electricity is not employed for this purpose on account of its erratic nature.

MATTER OF HORSEPOWER

Bloomington, Ill.—Editor MOTOR AGE—I am building a two cylinder two-cycle motor of 4-inch bore and stroke, to run at 750 revolutions per minute. What horse power should this develop and what should be the diameter of the fly wheel?—M. A. C.

The motor should develop about 6 horsepower at the speed given. The fly wheel should be 15 inches in outside diameter.

TOO MUCH OIL

Greencastle, Ind.—Editor MOTOR AGE—Can I replace the four dry cells furnished with a de Dion coil with a storage battery, and how many cells would be necessary?—E. T. DAVENPORT.

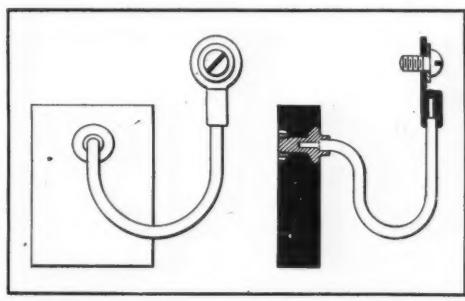
Three cells of any reliable make of storage battery can be substituted for the four de Dion cells now used, and will give as good, if not better, results.

MOTOR BRUSH HEATING

Grand Rapids, Mich.—Editor MOTOR AGE—Numerous users of electric vehicles may have been troubled by the heating of the commutators and brush holders on account of the constant arcing between the motor brushes and their holders and the consequent wasting of the carbon surfaces. This can be obviated by the plan shown in the illustration, which comprises a flexible copper conductor between the brush and the holder.

The anchor piece fastened in the carbon brush should be made of brass or copper rod. The beveled flange and shoulders should be turned to fit into countersunk holes made with an ordinary half-inch twist drill. The flexible cable can be made from the small wires of common electric light cord, so that the entire set is the equivalent of number 10 or 12 B. & S. gauge wire. One cable end is soldered into the brush anchor and the other into an ordinary connector. Hard solder is preferable, though soft solder may be used with fair results.

The cable end lug or connector is made of



MOTOR AGE Motor Brush Connection

rather heavy sheet copper bent into the shape shown in the illustration, if it is made by hand. It is generally possible, however, to obtain such connectors ready made at an electrical supply house. The connector is screwed into any convenient place on the brush holder, number 8 by 32 brass screws being used. Care

should be taken that the screw is not long enough to touch the brushes, as in such event the sliding of the brush in the holder would be restrained.

This device is useful even when there is no apparent trouble with the brushes or commutator. It reduces the resistance between the brushes and their holders. This resistance is comparatively small when the brushes are new and well coppered, and the holders are clean and bright on their inner surfaces. But when the grease and dirt thrown off by the revolving commutator collects between the parts the increased resistance often causes an appreciable loss in efficiency. It seems to me that the plan should be more commonly followed in manufacture.—F. J. LAMB.

HORSEPOWER REQUIRED

Baltimore, Md.—Editor MOTOR AGE—What horsepower will be required for an automobile weighing about 1,400 pounds, motor included, to attain a speed of at least 25 miles an hour, and to ascend grades of one in fifteen at about 6 miles an hour?—C. B. E.

It will take not less than 6 horsepower, while 7½ would be better.

ALUMINUM SOLDER

Elkhart, Ind.—Editor MOTOR AGE—Where can I get a reliable aluminum solder? Can you give me a recipe for making such solder?—P. E. F.

A good solder for aluminum can be made as follows: Tin, 10 parts; cadmium, 10 parts; lead, 1 part; zinc, 10 parts. Treat the parts to be soldered in a bath of a solution of hyposulphite of soda for about one hour before soldering.

ENGLISH SPARK PLUG

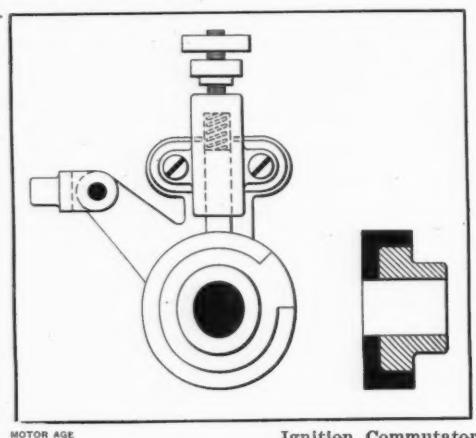
Boston, Mass.—Editor MOTOR AGE—Can you furnish me the address of the makers of the E. I. C. spark plug and battery? I notice in MOTOR AGE that it has been used with great success on the Panhard and a number of other European automobile motors.—R. Y.

The E. I. C. spark plug and battery are made by the Electric Ignition Co., Highgate street, Birmingham, England.

VALVE DISPOSITION

Aurora, Ill.—Editor MOTOR AGE—I have a 4 by 5-inch motor in which the inlet and exhaust valves are arranged side by side on the cylinder head. I built the motor and in making the cylinder patterns did not provide for

cooling the valve chambers. Is it good practice to locate the valves this way, or should they be arranged opposite each other on the same side of the cylinder with the plug between them, as in common practice on bicycle motors? I am going to make patterns for another cylinder with the valves in the cylinder head and water jacketed, and wish



to know which is the best disposition of the valves. Will you please inform me what space should be allowed for the water and how thick the cylinder walls should be for a 4 by 5-inch motor? Also, what size outlets should there be on the cylinder for the connections with the radiator? The water jacket has 1-inch inlets. Should these be larger or smaller, or are they correct? The exhaust valve has about ½ of an inch lift. Is this correct? Of what metal should the valve seats and valve stems be composed?—R. M.

The better plan is to locate the valves opposite each other. From ¼ to ½ of an inch should be allowed for water space in the jacket. The cylinder walls should finish 5-16 of an inch thick and the water jacket wall should be 3-16 of an inch thick. The water jacket inlets are correct. The outlets should be the same. The valve lift given is insufficient. The valve seats should be of cast iron and should be part of the valve chambers. The valves and stems should be made from steel forgings.

THE TREMBLER

Topeka, Kas.—Editor MOTOR AGE—I am using a trembler form of contact maker for the ignition on my motor, but it is not satisfactory, needing too close and frequent adjustment to keep it in working order. Can you publish a sketch of some other form of

construction that will give good results and need but little attention beside an occasional cleaning?—T. W.

The illustration shows a form of commutator, or circuit closer, which is of simple construction and is reliable, if a little attention is given it to keep the contact surfaces bright and clean. The commutator is made of phosphor bronze, with fiber insulation. The brush holder has a round copper or brass brush with a small brass spring to keep it firmly in contact with the commutator. The holder is insulated from the rocker arm casting by means of a fiber block. The rocker arm is provided with a clevis, which has a threaded opening for the rod which controls the movement of the device.

CHARGING BATTERY

Memphis, Tenn.—Editor MOTOR AGE—What is the best form of battery to use for charging a two-cell storage battery for ignition purposes in an automobile?—C. G.

Three cells of the improved Fuller mercury-bichromate battery will make an ideal charging outfit for this purpose. It can be obtained at any first-class electrical supply house.

VALVE SPRING WIRE

Kenosha, Wis.—Editor MOTOR AGE—With what gauge is piano wire, such as is used to make valve springs, measured? Will you kindly publish a table giving the sizes and corresponding numbers for piano wire suitable for the above purpose?—B. S.

Piano wire has a measure or gauge of its own, called the steel "music wire gauge." A table of the sizes desired is given herewith.

No. of gauge.	Size in decimals of an inch.	No. of gauge.	Size in decimals of an inch.
15	.0345	23	.0510
16	.0360	24	.0550
17	.0377	25	.0586
18	.0395	26	.0626
19	.0414	27	.0658
20	.0434	28	.0720
21	.0460	29	.0760
22	.0483	30	.0800

KENSINGTON OFFICERS

The Kensington Automobile Co., of Buffalo, N. Y., maker of the Kensington gasoline touring car, at a recent meeting elected the following officers: W. J. Knowles, president; Charles R. Huntley, vice-president; Frank D. Thorne, secretary, and Eugene A. Georger, treasurer. The Kensington factory is said to be taken to fill orders and additions to it are now contemplated.

THE COMPARATIVE EFFICIENCY OF HEAT ENGINES

All engines which derive their power from the combustion of some form of fuel are known as heat engines. They consist of three principal types—caloric or hot air engines, steam engines and gas or hydrocarbon engines, the latter using some form of liquid fuel which is consumed within the cylinder of the engine itself.



1. Caloric or hot air engine..... 0.01
2. Slide valve steam engine..... 0.05
3. Corliss steam engine..... 0.13
4. Rotary steam turbine..... 0.16
5. Triple expansion steam engine. 0.22
6. Hydro-carbon engine 0.38
7. Theoretical heat units..... 100

It is interesting to note in this connection that after nearly one hundred years of scientific study and research relative to the steam engine, the gas or hydrocarbon engine, with less than a quarter of a century of actual development, stands at the head of all other types of heat engines, in point of efficiency.

MULTIPLE CYLINDER IGNITION

An Effective Device Using only One Coil and Battery for Any Number of Cylinders—The Construction Is Durable and Free From Delicate Complication—Adapted to Common Forms of Motors

Nearly every gasoline automobile motor of two or more cylinders is equipped with a separate coil and battery for each cylinder. Numerous devices have been made and patented to overcome the necessity of so many coils and batteries, in most such cases some form of a switching device to switch the secondary current from one cylinder to another being used. None of these devices has become generally popular.

ANY NUMBER OF CYLINDERS

The device illustrated enables two or more cylinders to be ignited by means of only one induction coil and battery. As shown, it is arranged for four cylinders, with a double brush commutator, and four contact makers on the two-to-one cam shaft. It is only necessary to make a slight change in the construction to enable it to be used for any number of cylinders desired.

In the four cylinder arrangement a commutator with two contacts diametrically opposite and two brush holders at 90 degrees are used to give four successive and independent contacts. With a two cylinder motor the commutator will remain the same, but only one brush holder is required. For a three cylinder motor three contacts will be necessary—located around the commutator at 180 degrees apart—and a single brush holder.

There must, of course, be with each different arrangement as many cams or contact makers as there are cylinders; that is, one secondary circuit closing mechanism for each cylinder.

SYSTEM OF WIRING

The insulated point of the spark plug is connected to the insulated contact maker, which is attached to the cylinder by means of a fiber insulating pad or block that must not be less than $\frac{1}{4}$ of an inch thick and at least $\frac{1}{2}$ of an inch wider than the blade of the contact maker.

The brass or copper brushes and the brush holders are also insulated from their supporting arms by fiber pads. The lower terminal of the primary winding of the induction coil is connected directly to the right hand terminal of the battery. The upper terminal of the primary is grounded on the motor, as also is the wire from the upper secondary terminal, the latter by connecting it to the upper primary wire.

The lower secondary terminal and the right hand battery terminal are connected and then run in parallel to the two brush holder terminals.

THE ACTION

By this arrangement, or method of connecting the wires, the primary and battery circuit is closed through the ground on the motor at each successive contact of the commutator and brushes; but the secondary circuit is not completed until the cam is in contact with the insulated contact maker. This completes the circuit to the insulated point of the spark plug by means of the wire from the contact maker. The contact maker cams should be so set that they close the secondary circuits a trifle in advance of the

closing of the primary circuit by the commutator. A vibrator coil should be used with this device in order to secure the best results. It should have at least a half-inch secondary spark in air. Care should be taken to make all the connections exactly in the manner shown to ensure proper results. This type of ignition mechanism has given satisfactory results in actual use.

STORAGE BATTERY REPAIRS

Any cell in need of an overhauling can be readily detected by means of a low reading voltmeter.

In taking out a cell the connectors should be carefully sawed apart after the position of the lugs in relation to one another have been noted, that the cells may be replaced exactly in their former positions. Should trouble be experienced in lifting any of the elements

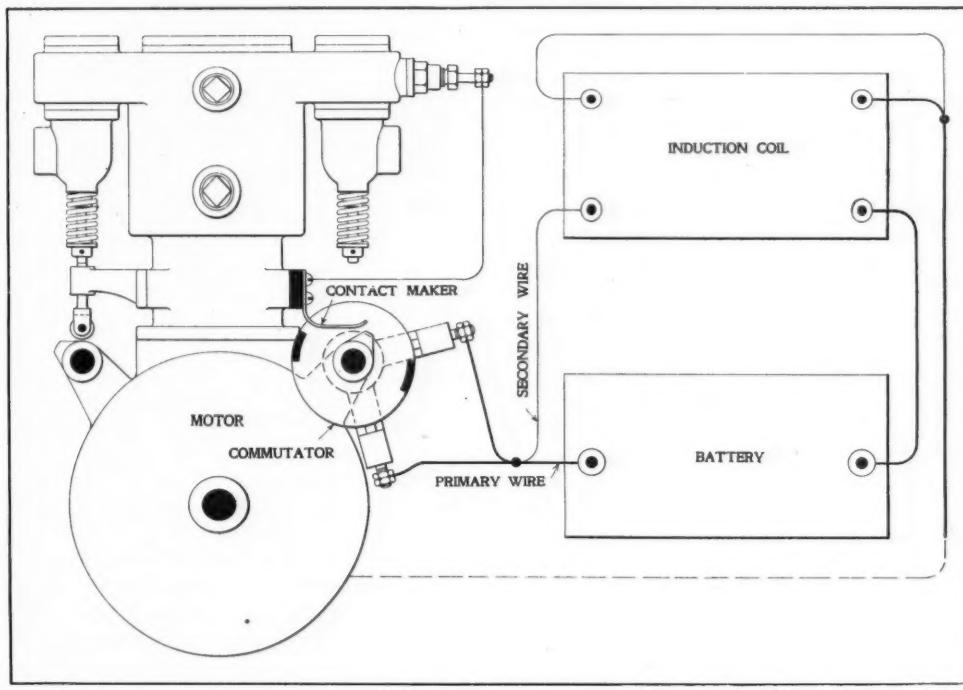
a cold one, by forcing into it elements altogether too large.

After the elements have been replaced put the covers on level, and fill the cells with their electrolyte just up to the under side of the cover. The sealing compound may then be poured on. When it hardens the electrolyte should be drawn off to its proper height above the plate tops.

The point concerning sealing, of course, applies only to those batteries on which sealing compounds are used. Modern practice seems tending towards a type of cell on which no sealing compound is needed.

Always slowly discharge the cells which have not been overhauled, that the whole set may be charged to an equal degree when the repaired cells have been replaced. Those that have undergone repairing have little or no charge in them.

It is not absolutely necessary to lead-burn the top connectors together, as a very creditable job can be done by anyone handy with a soldering iron. The surfaces to be soldered must be washed free of acid and scraped bright and clean. The soldering iron should be a fairly large one, with a rather long, slim point. It must be kept well tinned. Common



MULTIPLE CYLINDER IGNITION

from their jars, it is probable they have become swelled, or that the sealing compound has cemented them to the sides of the jar. When either of these faults is true immerse the complete cell in boiling hot water until the hard rubber jar has become softened, or the cement melted. No further difficulty will be experienced in removing the elements.

The accumulation of "mud" in the bottom of modern batteries is one of the chief causes of trouble, unless, of course, the battery has been subjected to a destructively large charging or discharging current. The obvious remedy for the latter is the renewal of the positive group of elements, and not infrequently those of the negative group also.

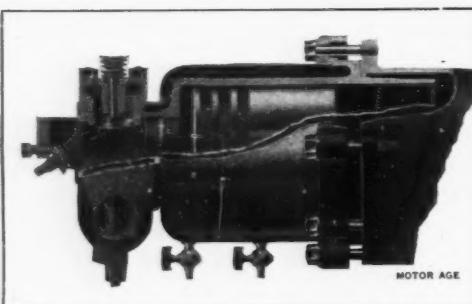
If the fault is due only to sediment in cell bottoms, the jar should be thoroughly washed out and the elements carefully rinsed off. They may then be returned to their jars. If the elements pass easily back into the jars it is not necessary to again use the hot water; but it is exceedingly easy to break a jar, especially

half-and-half solder can be used and Allen's soldering paste will be found an efficient flux.

When the cell connections have been soldered, the whole number should be put to charge and when fully charged the density of the electrolyte in each cell should be tested with a hydrometer. On being found to measure higher or lower than the degree recommended by the manufacturers it should be corrected by the addition of distilled water or of heavier electrolyte, as the case may be.

In batteries of the pasted type it is not wise to attempt to bring up the specific gravity of the electrolyte, or the voltage of any of the cells by overcharging, as the cells which have been correctly adjusted may suffer from the overcharge. With batteries of the formed type this practice is not so harmful.

The George N. Pierce Co., of Buffalo, N. Y., describe the Pierce Motorette and the Arrow motor car in a tastily arranged and well printed twelve-page folder.



THE CADILLAC HAS A CAREFULLY MADE MOTOR

The Cadillac motor is one of this new machine's most attractive features. In the first place it is made by the Leland & Faulconer Co., which insured its grade of workmanship in design. Also it presents features which, while not radical or freakish, are rather out of the common order. The valve actuating gears instead of being of the usual spiral pattern, commonly used on small runabout engines, are of the spur style and are entirely encased to run in oil. There are but two bearings for the crank shaft, the difficulty of aligning a third bearing in connection with the transmission gear thus being obviated. The carburetor is of the mechanical type, being operated by a simple mechanism driven from the cam shaft.

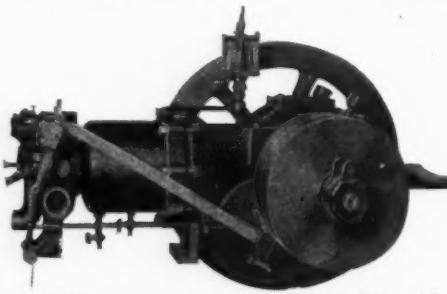
The water jacket is made of copper, which is pressed into shape and so arranged that all asbestos or rubber gaskets are rendered unnecessary. The cylinder is thus a simple casting, without coring and of comparatively light weight. The valve chambers are in separate pieces and are partially water jacketed on account of being adjacent to the head end of the water jacket. One of the cardinal points of the motor being the ease with which the parts may be taken out and replaced, it is not surprising to find a provision made for quickly removing the crank shaft. This is accomplished by removable end caps which allow the removal and replacement of the crank shaft without disturbing the motor from the frame. The crank shaft bearing is provided with bronze bushings.

The transmission is of the planetary type, but differs from ordinary construction in that only steel and bronze is used in it, while the entire gear is tightly encased to render it dust and dirt proof. There are no gears or other moving parts, which can under any conditions revolve at more speed than the motor shaft. There is only one internal gear, that being fastened to the driving sprocket. A spark plug with both terminals insulated in order to render unnecessary the grounding of one of the secondary wires of the motor is used. The plug is so disposed in the combustion chamber that the terminals are adjacent to the inlet valve so that they may secure whatever cleansing benefit there is from the incoming charge.

LEAKY CYLINDERS

Loss of compression is occasionally a source of considerable worry to the amateur automobile. In a solid-head cylinder he will, of course, at once look first at the sparking plug insulation to see if the leak is there; and next at the valve. The latter be either be stuck or require re-grinding. Gradual and not sud-

den loss of compression will show the necessity for the latter operation. The turning of piston rings so that the cuts are in line may account for loss of compression, and if this be the case the cylinder or cylinder head must come off in order that the rings may be turned so as to break the joints with one another. Many piston rings, however, are prevented from turning in their grooves by having a hole drilled through them where they are split. Through this hole a small pin is driven into the piston. Should attention be given to all these points, and the loss of compression continue, it would be well



The Cadillac Motor

to do as did a chauffeur recently in the same kind of trouble. He scraped the carbon deposit off the top of the piston, and found that it was cracked.

FIRST WITH SPRING FORKS

New Thomas Auto-bi Cushioned Front as well as Rear—Several Other Improvements

The three most notable improvements in the 1903 model 35 of the Thomas Auto-bi, manufactured by the E. R. Thomas Motor Co., of Buffalo, N. Y., are a trussed spring fork, hygienic rear spring frame and a combination leather and steel driving belt.

The general lines of construction have been retained, the motor still being used as the seat mast of the frame. The new spring fork is useful to insure against complete collapse of the fork as well as to cushion the frame against the constant jarring of the front wheels, thus materially relieving the vibration of the handle bars. The spring frame is of the well known hygienic cushion frame construction.

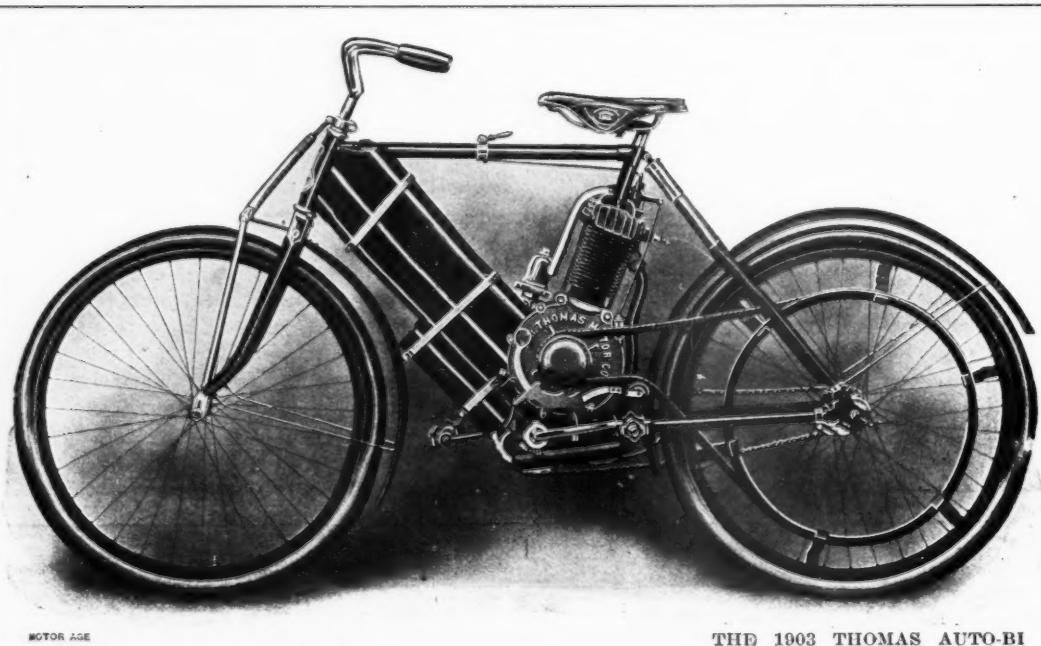
The combination leather and metal belt is introduced after careful experiment to give the flexibility of the regular belt for transmission without its troublesome stretching tendency. Other minor improvements are: Large exhausts; trembler springs fulcrumed at the lower part of the controller box and of greater length; contact screw fastenings secured by the use of cone-shaped fiber washers, which are not liable to work loose and form imperfect insulation; larger outlet for refuse oil; oil inlet below the center of crank case; engine pulley corrugated to increase the gripping power; waste chamber to prevent oil leakage; automatic spring idler; safety switch made more durable and smaller and with only one control holding screw.

CARE OF NEW MOTORS

The necessity for sufficient lubrication and frequent washing out of a new motor is so impressed upon beginners by the makers or agents that many are inclined to overdo the thing. For the first 500 miles or so it is into the motor crank chamber over 40 or 50 miles, or according to circumstances, having previously drained off the old oil. It is also advisable to wash out the crank chamber with kerosene after running above 150 miles.

If kerosene is injected into the cylinder for cleaning purposes it is as well to use a little gasoline afterward to clear away the kerosene, otherwise some difficulty may be experienced in starting up, and a carbon deposit will be formed by the remaining kerosene. For these reasons it is as well, perhaps, to use gasoline alone for cylinder cleaning purposes, confining the heavier oil to use within the crank chamber.

The postal service of Switzerland will most likely be run by automobiles very shortly. Tests are now being made for the replacement of the horse delivery service all over the country and the first results have been most satisfactory.



THE 1903 THOMAS AUTO-BI

REVIEW OF CURRENT AUTOMOBILE PATENTS



MOTOR SUPPORT

Letters patent No. 718,161, dated January 13—Oscar H. Schildback, of South Bend, Ind.—The invention provides means for the attachment of the motor to the body of an electric vehicle in such a manner that the entire motor can be readily removed and so also that the tension on the driving chain can be easily adjusted.

The motor is carried by end plates, each of which has on its inner face near the top longitudinal ribs or lugs which register with and are adapted to engage corresponding longitudinal recesses in the outer faces of parallel bars which are secured rigidly to the under side of the vehicle body. These bars are preferably tied together by a cross bar to insure their positive alignment. In line with the ribs on the motor end supports are slots through the plates, these slots extending over sufficient length to provide the required amount of backward and forward movement of the motor to furnish the range of chain adjustment necessary in ordinary practice. Through these slots and through registering holes in the longitudinal slotted bars on the body pass bolts, by means of which the motor frame may be rigidly secured to the body in any position of backward and forward adjustment.

To strengthen the support and to maintain a constant relation between the driving wheel axle and the motor shaft in any position of adjustment of the motor, and also to assist in the movement of the heavy motor when an adjustment is being made, an ordinary tie or distance rod with the conventional turn-buckle is utilized between the motor shaft and the wheel axle.

MIXING DEVICE

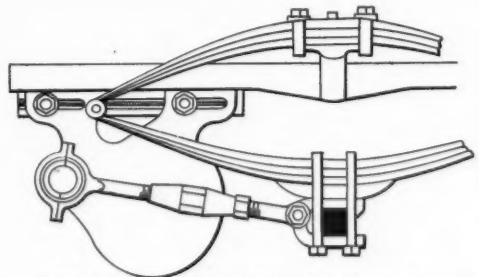
Letters patent No. 718,552, dated January 13—Henning F. Wallmann, of Chicago; assignor to the Wallmann Engine Co., of Chicago—A mixer for direct attachment to the head of a hydro-carbon motor comprises this invention. Its purpose is to thoroughly, but gradually, mix the fuel with the air just prior to its admission to the combustion chamber of the motor.

On the head of the motor is placed a cylindrical chamber into the top of which the fuel may be admitted through a conventionally formed spring seated valve that is mechanically opened by a rocker arm actuated by the motor. This cylindrical chamber is combined on one side with an extension compartment into which air is admitted by a valve similarly disposed and actuated in the same manner as the fuel valve.

Within the cylindrical chamber is a series of super-disposed disks. Each disk consists of a short cylindrical casing within which is a body portion provided with two distinct and alternately arranged radial openings or slots. The slots of one set extend vertically from the top to the bottom of the disk, while those of the other set are curved to connect the side of the disk with the bottom but are non-communicative with the top. The latter slots hence connect with the open air compartment

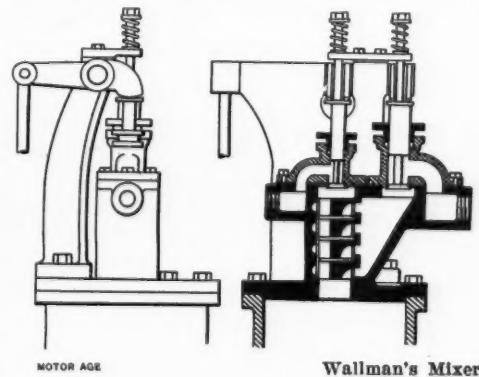
at the side of the cylindrical central chamber. That all of the radial slots of this description may be equally communicative with the air chamber half-round circumferential slots are cut in the wall of the central chamber to register with the respective series of slots in the various disks. The deflected slots of connecting the air chamber with the bottom of each disk are of the same size in each disk, but the straight alternate slots running from the top to bottom of each disk are larger in the second disk than in the top, and regularly increase in size in each disk downward. There are small open spaces between the disks.

In the assumed method of operation the fuel enters the open space at the top of the cylindrical chamber through the valve at the same time that a quantity of air is admitted to



MOTOR AGE Schildback's Motor Support

the side chamber through the other valve. The fuel then passes downward through the straight slots in the uppermost disk to the open space between this disk and the one below it. Here the charge is met with air entering through the side or deflected slots of the first disk. The mixture thus formed continues through the straight slots in the second disk, after which passage it is met with more air entering through the deflected slots of the second disk. Its travel to the inlet port to the combustion chamber is continued in this manner, the mixture being given an additional charge of air as it passes each successive disk. The mixture of the fuel with the air of each charge is thus not abrupt, although the entire process may be quick on



MOTOR AGE Wallman's Mixer

account of the rapidity with which the suction of the motor will draw the mixture through the central chamber.

To avoid complication and expensive processes in the construction of the slotted disks, each is made with the body portion in a distinct piece from the outer wall, the latter being a thin walled cylinder which is slipped onto the body portion after the cutting of the various slots. Several modifications in construction are specified, in all of which the same principle of operation is employed.

OTHER PATENTS

Letters patent No. 718,097, dated January 13—Charles Crompton, of Worcester, Mass.—This is at least a novelty. It provides a four cylinder horizontal steam engine with the cylinders on top of one another. The crank shaft is vertical and drives a vertical shaft over the rear wheel axle through a spur gear and pinion. The rear shaft transmits the power to the wheel axle by an universal joint and bevel gear. The boiler is not particularly specified in this patent, it being only mentioned as of two sections, one on each side of the engine in the rear of the vehicle body.

Letters patent No. 718,213, dated January 13—William Norris, of Preston, England; assignor to T. Coulthard & Co., of Preston, England—The patent covers the arrangement of the elements of a steam truck whereby the coal bunker is on the extreme front end of the boiler and drivers platform and forms a protecting buffer in case of collision.

Letters patent No. 718,231, dated January 13—William E. Whitehead, of Godalming, England—The invention comprises a fifth or leading wheel for steering a motor vehicle, this fore wheel being flexibly mounted relative to, but positively controlled from, the vehicle frame.

Letters patent No. 718,303, dated January 13—Linton T. Bassett, of Holyoke, Mass.—One feature of the invention is a vertical slideway mounting for the wheel axles, that helical springs may be used; the other feature is transmission by flexible shaft from an electric motor disposed in the rear end of the body.

Letters patent No. 718,334, dated January 13—William P. Flint, of Pittsburg, Pa.; assignor to the Westinghouse Machine Co., of Pittsburg, Pa.—An ignition system for hydro-carbon motors, whereby either a dynamo or battery may be used to furnish the current, forms the subject of the patent.

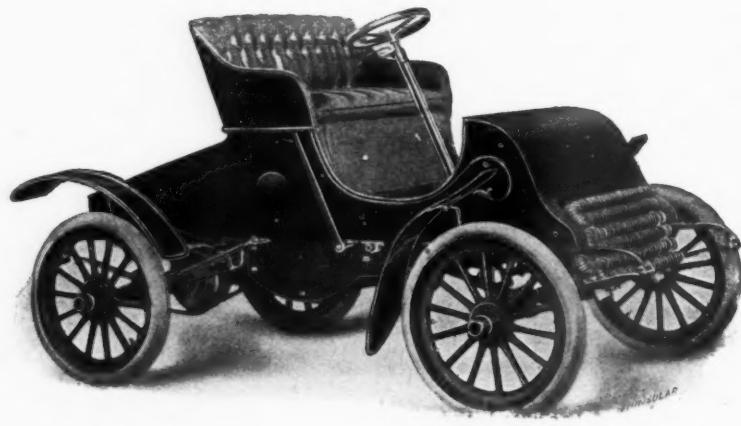
PECULIAR LAW POINT

A consignee of goods employed an expressman to cart the goods to his place of business, and the expressman, at the depot, looked at the box containing the goods, and signed a "clear" receipt, making no complaint, but the court held that this did not prevent the consignee from showing that the goods were wet, that it did not rain while being carted, and that the consignee was entitled to recover from the carrier for the damage to the goods in the box.

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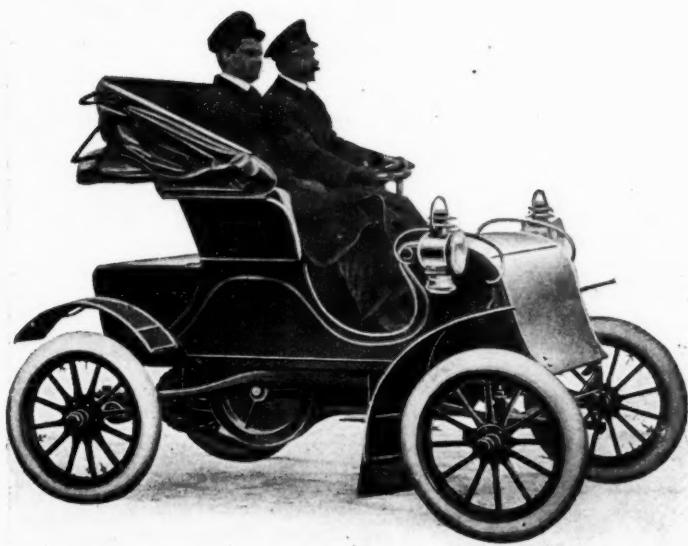
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The Cadillac Company of Illinois, Chicago, Ill.
John Wanamaker, Philadelphia, Pa.
William E. Metzger, Detroit, Mich.
The Pence Automobile Company, Minneapolis, Minn.
The Conrad Mueller Company, Indianapolis, Ind.
American Cycle Manufacturing Company, Boston, Mass.
Cleveland Automobile & Supply Company, Cleveland, Ohio.
American Cycle Manufacturing Company, Washington, D. C.
Centaur Motor Vehicle Company, Buffalo, N. Y.
Oscar S. Lear, Columbus, Ohio.

American Cycle Manufacturing Company, Providence, R. I.
New Jersey Automobile Company, Newark, N. J.
Crescent Automobile Company, Jersey City, N. J.
A. T. Wilson, Denver, Colo.
R. V. Connerat, Savannah, Ga.
Michigan Automobile Company, Grand Rapids, Mich.
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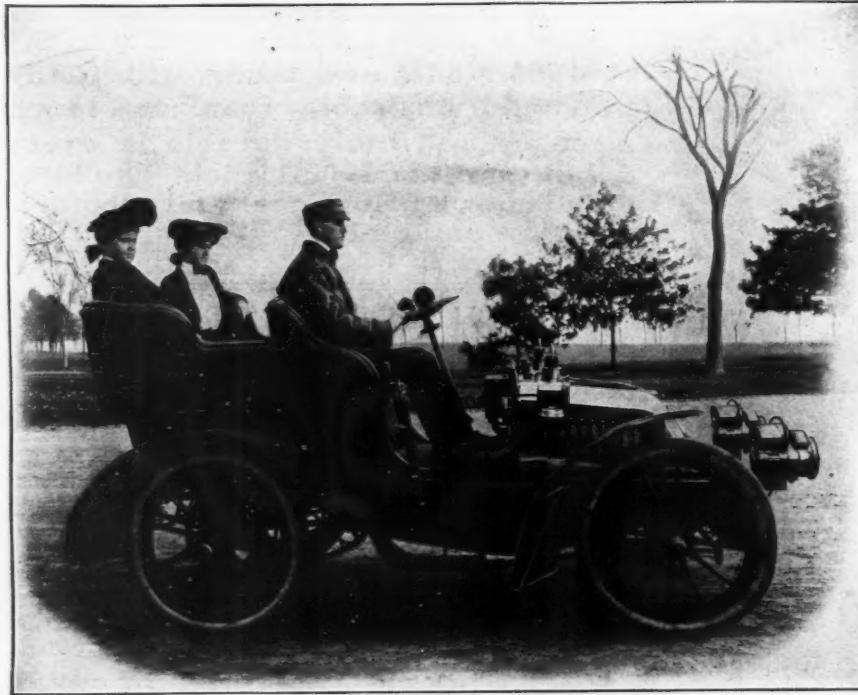
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STEAM VEHICLES

NUMBER OF DIFFERENT PATTERNS DISPLAYED, 11.

Wood Wheels ... 8	Meteor, Foster, Toledo, White, Locomobile, Grout Tonneau, Grout Runabout, Lane.	Flash Boiler ... 1	White.
Wire Wheels ... 2	Mobile, Prescott.	Boiler in Front. 2	Meteor, Grout Tonneau.
Tubular Wheels. 1	Stearns.	Engine in Front. 1	White.
Single Tube Tires 5	Stearns, Mobile, Locomobile, Grout Runabout, Prescott.	Boiler under Body 9	Stearns, Foster, Mobile, Toledo, White, Lane, Locomobile, Grout Runabout, Prescott.
Detachable Tires. 6	Meteor, Foster, Toledo, White, Grout Tonneau, Lane.	Engine under Body 10	Stearns, Meteor, Foster, Mobile, Toledo, Locomobile, Grout Tonneau, Grout Runabout, Prescott, Lane.
Tubular Running Gear 4	Meteor, Toledo, Locomobile, Grout Runabout, Prescott, Lane.	Automatic Air Pressure Pump 9	Stearns, Meteor, Mobile, Toledo, White, Prescott, Lane, Grout Tonneau, Grout Runabout.
Angle or Channel Steel Running Gear ... 4	Meteor, Foster, Locomobile, Grout Tonneau.	Automatic Fuel Regulator 9	Stearns, Meteor, Foster, Mobile, Toledo, White, Locomobile, Prescott, Lane.
Wood Running Gear 2	Stearns, White.	Automatic Water Regulator 5	Mobile, Toledo, White, Grout Tonneau, Grout Runabout.
Wheel Steer 4	Meteor, White, Locomobile, Grout Tonneau.	Pilot Light 10	Stearns, Foster, Mobile, White, Locomobile, Grout Tonneau, Grout Runabout, Prescott, Lane.
Lever Steer 7	Stearns, Foster, Mobile, Toledo, Locomobile, Grout Runabout, Prescott, Lane.	Automatic Lubrication 8	Meteor, Foster, Mobile, White, Locomobile, Grout Tonneau, Grout Runabout, Prescott.
Water Tube Boiler 2	Foster, Toledo.	Kerosene Fuel. 2	Mobile, Toledo.
Fire Tube Boiler 8	Stearns, Meteor, Mobile, Locomobile, Grout Tonneau, Grout Runabout, Prescott, Lane.	Condenser 4	Foster, Toledo, White, Grout Tonneau.
		Steam Water Pump 2	Meteor, Prescott.

ELECTRIC VEHICLES

NUMBER OF DIFFERENT PATTERNS DISPLAYED, 8.

Wood Wheels ... 5	Studebaker, National, Waverley, Vehicle Equipment Co., Columbia.
Wire Wheels ... 3	Baker, Ajax, Centaur.
Tubular Wheels. 0	
Single Tube Tires 4	Baker, Ajax, Columbia, Centaur.
Detachable Tires. 3	Studebaker, National, Waverley.
Solid Tires 2	Columbia, Vehicle Equipment Co.
Tubular Running Gear 3	Studebaker, Baker, Ajax.
Angle or Channel Steel Running Gear 0	
Wood Running Gear 2	Columbia, Centaur.
Wheel Steer 0	
Lever Steer 8	Studebaker, National, Waverley, Baker, Ajax, Vehicle Equipment Co., Centaur, Columbia.

Low Voltage Motor 5	Baker, Vehicle Equipment Co., Ajax, Columbia, Centaur.
High Voltage Motor 4	Studebaker, National, Waverley, Columbia.
Chain Drive to Wheels 4	Studebaker, Baker, Ajax, Centaur.
Gear Drive to Wheels 4	National, Waverley, Vehicle Equipment Co., Columbia.
Double Motor ... 2	Vehicle Equipment Co., Columbia.
Single Motor ... 6	National, Waverley, Studebaker, Baker, Ajax, Centaur.
Divided Battery. 4	Studebaker, Ajax, Columbia, Centaur.
Motor Suspended on Axle ... 3	National, Waverley, Columbia.
Motor Suspended from Body ... 4	Baker, Vehicle Equipment Co., Ajax, Centaur.
Motor Hung from Frame 1	Studebaker.

GASOLINE VEHICLES.

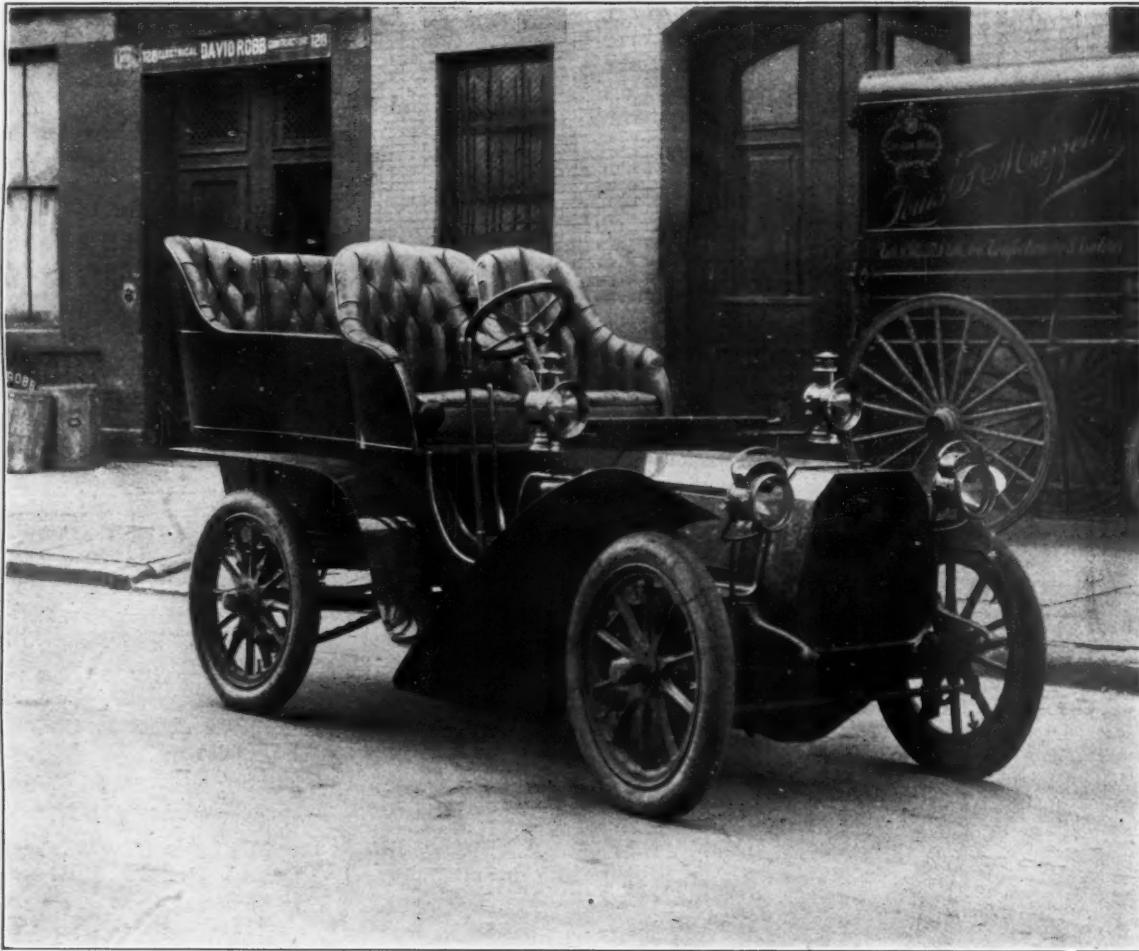
Number of Constructionally Different Styles, 65.

Wood Wheels....56	Ward-Leonard, Winton, Duryea, Pierce Motorette, Pierce Arrow, Rambler, Thomas, Spaulding, Robinson, Searchmont, Stevens-Duryea, Olds, Automotor Heavy Car, Automotor Light Car, Conrad, Packard, Packard, Peerless, Peerless, Long Distance, Long Distance, Autocar, Walter, Knox, Pan-American, Toledo, Stearns, Locomobile, Locomobile, Berg, Berg, Matheson, Conrad, Haynes-Apperson, Moyea, Yale, Columbia, Hoffman, Mechaley, Century, Franklin, Cadillac, De Dion, Walter, Stearns, American, Buckmobile, Warwick, Hall, Elmore, Kensington, Desberon, Fiat, Ward-Leonard, Upton, Olds Tonneau.	Wheel Steer....51	Ward-Leonard, Winton, Pierce Arrow, Thomas, Spaulding, Covert, Robinson, Searchmont, Stevens-Duryea, Automotor, Automotor, Conrad, Packard, Peerless, Peerless, Long Distance, Long Distance, Walter, Pan-American, Toledo, Stearns, Locomobile, Locomobile, Conrad, Haynes-Apperson, Moyea, Yale, Columbia, Hoffman, Mechaley, Franklin, Cadillac, De Dion, Walter, Stearns, American, Country Club, Hall, Elmore, Kensington, Desberon, Fiat, Ward-Leonard, Olds Tonneau, Upton, Berg, Berg, General, Matheson.
Wire Wheels.... 6	Covert, Conrad Runabout, Orient Runabout, Orient Buckboard, Whitney, Country Club Car.	Column Steer.... 2	Autocar, Warwick.
Tubular Wheels.. 3	Crest, General, Cleveland.	Lever Steer....12	Duryea, Pierce Motorette, Rambler, Crest, Olds, Knox, Orient Runabout, Orient Buckboard, Cleveland, Century, Whitney, Buckmobile.
Single Tube Tires14	Rambler, Olds, Conrad, Orient Runabout, Orient Buckboard, Berg, Berg, Mechaley, Cadillac, Whitney, Country Club Car, Elmore, Desberon, Pierce Motorette.	Vertical Motor...39	Ward-Leonard, Pierce Motorette, Pierce Arrow, Crest, Spaulding, Covert, Robinson, Searchmont, Automotor, Automotor, Conrad, Peerless, Peerless, Long Distance, Long Distance, Autocar, Walter, Pan-American, Toledo, Locomobile, Locomobile, Orient Runabout, Orient Buckboard, Berg, Berg, General, Conrad, Moyea, Columbia, Hoffman, Brazier, Century, Franklin, De Dion, Buckmobile, Warwick, Elmore, Kensington, Fiat, Desberon, Ward-Leonard, Upton, Packard.
Detachable Tires..51	Ward-Leonard, Winton, Duryea, Pierce Arrow, Thomas, Crest, Spaulding, Covert, Robinson, Searchmont, Stevens-Duryea, Automotor, Automotor, Packard, Packard, Peerless, Peerless, Long Distance, Long Distance, Autocar, Walter, Knox, Pan-American, Toledo, Stearns, Locomobile, Locomobile, General, Matheson, Conrad, Haynes-Apperson, Cleveland, Yale, Columbia, Hoffman, Brazier, Century, Franklin, De Dion, Walter, Stearns, American, Buckmobile, Warwick, Hall, Kensington, Fiat, Ward-Leonard, Upton, Olds Tonneau, Moyea.	Horizontal Motor.26	Winton, Rambler, Thomas, Stevens-Duryea, Olds, Packard, Long Distance, Autocar, Knox, Stearns, Matheson, Haynes-Apperson, Cleveland, Yale, Hoffman, Mechaley, Century, Cadillac, Walter, Whitney, Stearns, American, Country Club, Hall, Kensington, Olds Tonneau.
Solid Tires..... 0		One Cylinder....22	Pierce Motorette, Rambler, Thomas, Crest, Olds, Covert, Packard, Long Distance, Knox, Stearns, Orient Runabout, Orient Buckboard, General, Matheson, Cleveland, Hoffman, Century, Cadillac, Whitney, American Warwick, Ward-Leonard.
Tubular Running Gears12	Pierce Motorette, Pierce Arrow, Crest, Stevens-Duryea, Walter, Conrad, Moyea, De Dion, Walter, Warwick, Kensington, Ward-Leonard.	Two Cylinders...28	Winton, Pierce Arrow, Spaulding, Searchmont, Conrad, Stevens-Duryea, Automotor, Conrad, Peerless, Long Distance, Autocar, Walter, Toledo, Locomobile, Berg, De Dion, Stearns, Buckmobile, Brazier, Country Club, Hall, Elmore, Kensington, Desberon, Olds Tonneau, Haynes-Apperson, Mechaley, Yale.
Angle or Channel Running Gears.38	Winton, Rambler, Thomas, Covert, Robinson, Automotor, Automotor, Conrad, Packard, Packard, Peerless, Peerless, Long Distance, Long Distance, Autocar, Pan-American, Stearns, Locomobile, Locomobile, Orient Runabout, Berg, Berg, Haynes-Apperson, Moyea, Cleveland, Yale, Columbia, Hoffman, Mechaley, Century, Franklin, Cadillac, Whitney, Country Club Car, Elmore, Kensington, Desberon, Upton.	Three Cylinders.. 2	Toledo, Duryea.
Wood Frame 4	Orient Buckboard, General, Buckmobile, Toledo.		

GASOLINE VEHICLES—Continued

Four Cylinders	15	Ward-Leonard, Robinson, Automotor, Packard, Peerless, Pan-American, Toledo, Locomobile, Berg, Moyea, Columbia, Franklin, Walter, Fiat, Upton.	Air Cooled Motors	4	Crest, Knox, Franklin, Orient Buckboard.
Magneto or Dy-namo	5	Ward-Leonard, Berg, Berg, Columbia, Duryea.	Sliding Gear Transmission	25	Ward-Leonard, Thomas, Spaulding, Covert, Searchmont, Conrad, Packard, Packard, Peerless, Peerless, Autocar, Walter, Toledo, Locomobile, Locomobile, Conrad, Columbia, Hoffman, Walter, Stearns, Buckmobile, Kensington, Desberon, Fiat, Ward-Leonard.
Batteries	44	Winton, Pierce Motorette, Pierce Arrow, Rambler, Thomas, Crest, Covert, Stevens-Duryea, Olds, Automotor, Automotor, Conrad, Packard, Packard, Long Distance, Long Distance, Autocar, Walter, Knox, Pan-American, Stearns, Orient Runabout, Orient Buckboard, General, Matheson, Conrad, Moyea, Cleveland, Yale, Hoffman, Mechaley, Century, Cadillac, De Dion, Walter, Whitney, Stearns, American, Buckmobile, Hall, Kensington, Desberon, Ward-Leonard, Olds Tonneau.	Sliding C'utch Gear	12	Pierce Arrow, Stevens-Duryea, Pan-American, Berg, Berg, Matheson, Moyea, Brazier, De Dion, American, Warwick, Olds Tonneau.
Both	16	Spaulding, Robinson, Searchmont, Peerless, Peerless, Toledo, Locomobile, Locomobile, Haynes-Apperson, Brazier, Franklin, Warwick, Country Club, Elmore, Fiat, Upton.	Planetary Gear	23	Duryea, Pierce Motorette, Rambler, Olds, Automotor, Automotor, Long Distance, Long Distance, Knox, Stearns, Orient Runabout, General, Yale, Cleveland, Mechaley, Century, Franklin, Cadillac, Whitney, Country Club, Hall, Elmore, Upton.
Motor Front	35	Ward-Leonard, Pierce Arrow, Crest, Spaulding, Covert, Robinson, Searchmont, Automotor, Automotor, Conrad, Packard, Peerless, Peerless, Long Distance, Autocar, Walter, Pan-American, Toledo, Conrad, Moyea, Columbia, Brazier, Franklin, De Dion, Walter, Elmore, Kensington, Desberon, Fiat, Ward-Leonard, Upton, Locomobile, Locomobile, Berg, Berg.	Spur Gear Friction Clutch	4	Winton, Crest, Robinson, Haynes-Apperson.
Motor Back	30	Winton, Duryea, Pierce Motorette, Rambler, Thomas, Stevens-Duryea, Olds, Packard, Long Distance, Knox, Stearns, Orient Runabout, Orient Buckboard, General, Matheson, Haynes-Apperson, Cleveland, Yale, Hoffman, Mechaley, Century, Cadillac, Whitney, Stearns, American, Buckmobile, Warwick, Country Club, Hall, Olds Tonneau.	Direct Drive	1	Orient Buckboard.
Motor Back, Hood Front	20	Rambler, Thomas, Packard, Long Distance, Stearns, Matheson, Haynes-Apperson, Cleveland, Yale, Hoffman, Mechaley, Whitney, Stearns, American, Warwick, Country Club, Hall, Winton, General, Olds Tonneau.	Spur Differential	36	Ward-Leonard, Winton, Pierce Motorette, Pierce Arrow, Rambler, Thomas, Crest, Spaulding, Covert, Stevens-Duryea, Automotor, Automotor, Packard, Toledo, Orient Runabout, Orient Buckboard, General, Matheson, Haynes-Apperson, Cleveland, Yale, Columbia, Hoffman, Mechaley, Century, Franklin, Cadillac, De Dion, Whitney, Stearns, Buckmobile, Warwick, Elmore, Ward-Leonard, Upton.
Mechanical Lubrication	40	Ward-Leonard, Pierce Arrow, Rambler, Thomas, Crest, Covert, Robinson, Searchmont, Olds, Automotor, Packard, Peerless, Peerless, Long Distance, Long Distance, Autocar, Walter, Pan-American, Toledo, Stearns, General, Haynes-Apperson, Moyea, Yale, Columbia, Brazier, Mechaley, De Dion, Walter, Whitney, Stearns, Country Club, Hall, Elmore, Kensington, Desberon, Fiat, Ward-Leonard, Upton, Olds Tonneau.	Bevel Gear Differential	29	Duryea, Robinson, Searchmont, Olds, Conrad, Packard, Peerless, Peerless, Long Distance, Long Distance, Autocar, Walter, Knox, Pan-American, Locomobile, Locomobile, Berg, Berg, Conrad, Moyea, Brazier, Walter, American, Country Club, Hall, Kensington, Desberon, Fiat, Olds Tonneau.
Mechanical Inlet Valves	12	Rambler, Thomas, Olds, Long Distance, Long Distance, Toledo, General, Matheson, Cadillac, Walter, Country Club, Olds Tonneau.	Bevel Gear Drive	18	Ward-Leonard, Pierce Arrow, Crest, Covert, Automotor, Automotor, Packard, Long Distance, Autocar, Walter, Brazier, De Dion, Walter, Kensington, Desberon, Ward-Leonard, Peerless, Peerless.
			Single Chain Drive	34	Winton, Duryea, Rambler, Thomas, Stevens-Duryea, Olds, Conrad, Packard, Long Distance, Knox, Stearns, Orient Runabout, Berg, Berg, General, Matheson, Conrad, Haynes-Apperson, Cleveland, Yale, Hoffman, Mechaley, Century, Franklin, Cadillac, Whitney, Stearns, American, Buckmobile, Warwick, Elmore, Olds Tonneau, Hall, Country Club.
			Double Chain Drive	11	Spaulding, Robinson, Searchmont, Pan-American, Toledo, Locomobile, Locomobile, Moyea, Fiat, Columbia, Upton.
			Spur Gear Drive 2		Orient Buckboard, Pierce Motorette.

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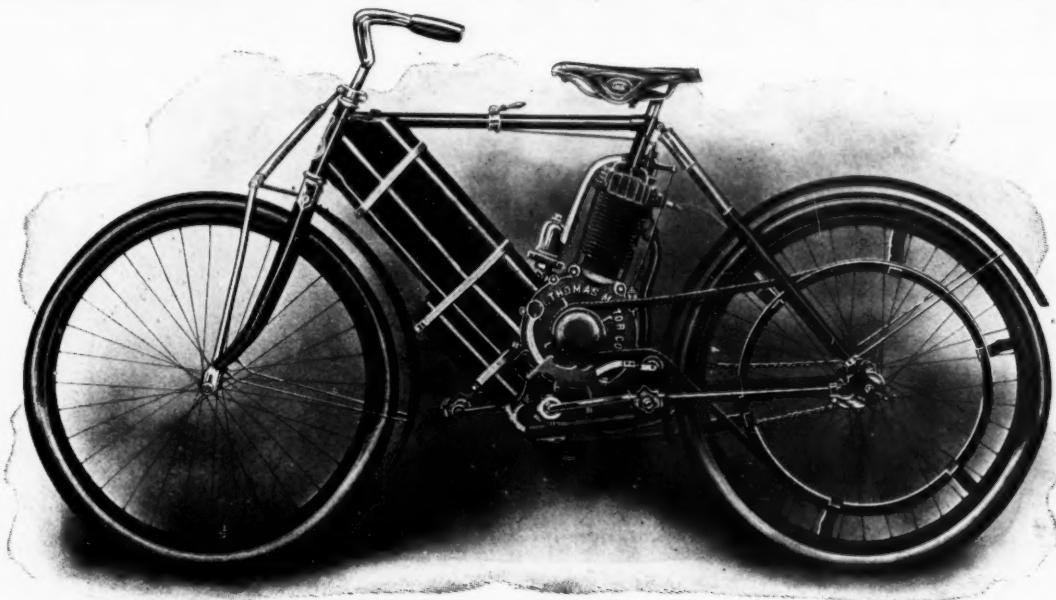
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